

# Improving Access to Good Quality Agri-inputs

R7929 -001

A PETRRA sub-project by:  
Andrew Goodland  
Dr W.M.H Jaim  
Dr M.A. Jabber  
with the BRR Agricultural Economics Division

September 2001

## Table of contents

Executive summary.....	ii
Acronyms and glossary.....	v
Introduction.....	1
Background to the project.....	1
Objectives of the research:.....	1
Approach.....	1
Section One: The context and main issues. ....	2
Appropriate roles of the public and private sectors .....	6
Markets and transaction costs .....	8
What is access to good quality inputs? .....	9
Section Two: Farmer survey findings.....	10
District and site selection.....	10
Results from farmer surveys .....	12
Household characteristics. ....	12
Cropping Patterns.....	12
Fertilizer:.....	13
Pesticides.....	15
Seed.....	18
Section Three: Input marketing systems and behaviour.....	22
Why look at marketing systems? .....	22
Fertilizer.....	22
Pesticides.....	25
Seed.....	26
Section Four: Summary of key findings.....	28
Section Five: Where to go from here? .....	30
Projects.....	30
Agent scheme - Zimbabwe .....	30
Projects: Loans for crop production - Uganda.....	31
Projects: Seed systems - Nepal .....	32
Projects: Farmer group purchase of inputs .....	32
Policies:.....	33
Improved monitoring of quality.....	33
Improved public provision of information.....	33
Research:.....	33
References:.....	35

## Executive summary

Following PETRRA stakeholder analyses in south-west Bangladesh, research was commissioned to explore in greater depth the issues of access to good quality agri-inputs (fertilizer, pesticides and seed) for resource poor rice producing households. Access to good quality inputs is vital for farmers to increase productivity and consequently to improve their livelihood status. The stakeholder analyses identified that farmers experienced problems with obtaining and using inputs in the generally liberalized input markets that exist in Bangladesh. In particular, farmers had no confidence in the sellers of inputs, and believed that they were knowingly sold poor quality inputs. Without information on distinguishing the quality of inputs, farmers have to depend on the trust with input sellers, but this trust was absent and farmers felt vulnerable to unscrupulous sellers.

Project activities began in January 2001, with a training component funded by DFID's Crop Post Harvest Research Programme, which was attended by the project team as well as NGOs (CARE, BRAC, PROSHIKA) and public sector partners (Department of Agricultural Marketing). The research began in March 2001 with visits to field sites in Rangpur and Lamonirhat in the north, and Khulna and Satkhira in the south-west. In all of these sites focus group discussions were held with farmers in selected villages to debate issues related to input access. In addition, input traders, local NGOs and government officers were consulted to develop a better understanding of the issues. Following this a farmer questionnaire was developed to explore farmer behaviour and perceptions in greater depth. The questionnaire survey was conducted between May and July 2001. In June 2001 a rapid market assessment examined how the market functions and where the quality of inputs may be threatened. Throughout the project relevant literature was reviewed and experiences around the world were explored to identify potential lessons for the Bangladesh situation. The project culminated with a seminar in late August to present and discuss the findings. This report documents the findings and conclusions of the research.

### Key findings

#### *Input use*

- There is a high level of fertilizer and pesticide use, even on the smallest farms, showing the importance given to using agri-chemicals by farmers, and also showing that despite fears of low quality, farmers are still continuing to use high levels of inputs.
- There is a general lack of knowledge of fertilizer and pesticide use for both farmers and traders. Farmers depend mainly on other farmers or on traders for advice on the use of inputs as there is relatively little contact with DAE officers.

#### *Input availability*

- Pesticide, fertilizer and seed markets are more or less liberalized, with private trade and competition. The production of urea and of good quality seed is still largely in the hands of parastatal organizations.

- The markets for fertilizer and pesticide appear to function well, with the types and quantities that farmers use available locally.
- In the seed market, BADC seed is most desired, but is not readily available even though farmers are willing and eager to purchase it.

#### *Input accessibility*

- Price is an important component of access, and price is influenced by market efficiency.
- The markets we explored in our study areas appear to be competitive and efficient, with no evidence of monopolies or excessive prices in open market.
- However, smaller farmers are often forced to purchase inputs on credit (especially fertilizer and pesticides), limiting their options and increasing opportunity for exploitation.
- Obviously, financial capital (i.e. levels of cash) is important in gaining access to desired inputs, however, social capital is also very important for those farmers who are unable to pay cash on the spot, as they depend on credit either from the input sellers or from other informal sources (friends, family, moneylenders). Credit will only be given to farmers by people who trust them.

#### *Input quality*

- It is very difficult for farmers to assess quality of inputs (fertilizer, pesticides and seed) by the means available to them (basically visually). Laboratory testing is the only sure way of determining quality (other than by using the input, by which time, of course, it is too late for the farmer if it is poor quality).
- The majority of farmers believe that fertilizers and pesticides are adulterated. More farmers believe fertilizers and pesticides are adulterated than have actually experienced it. Although perceptions of poor quality exceed experiences, perceptions are important as they affect farmers' production behaviour and may lead to a mis-allocation of inputs.
- The poor use of inputs (due to the lack of information on proper use) probably leads to an over-estimation of the problem of poor quality inputs. Only a comprehensive survey and laboratory testing of inputs could reveal the true extent of poor quality inputs.
- The difficult for farmers to assess quality means that they depend on trust for quality, however there is little trust of sellers.
- Trust works two ways - it is in the interest of traders to sell good quality so that they develop a good reputation and farmers trust them, and hence they increase business.
- There are opportunities in particular in the fertilizer market for adulteration at different levels of marketing system – this is because the fertilizer is often loose and therefore mixing is relatively easy. It may not be the actual sellers of the inputs who are adulterating them, though they often receive the blame from farmers.
- Adulteration in the pesticide market is less easy for wholesalers and retailers as it comes in sealed bottles. However, there are widespread allegations of adulteration – possibly this occurs at the manufacturing level, or possibly adulteration is blamed for the poor application of pesticides.

- Inferior quality pesticides are smuggled from India, especially in border areas. Some smuggled pesticides are banned in Bangladesh and potentially have negative health and environmental impacts. Smuggled produce escapes import duties and is therefore sold cheaply in Bangladesh. The import duties encourage smuggling.
- international brands of pesticides are recognised as the best quality – however, developing a brand is expensive and increases prices to beyond many farmers' means.
- BADC is recognised as the best seed, though is not always available or accessible as prices of demanded seeds escalate to beyond farmers' means

#### *Input regulation*

- Generally, suitable regulation is in place in all the input sectors considered.
- however, enforcement of regulation is fairly weak, due to resourcing constraints, in particular the sampling and laboratory testing of agri-chemicals.
- Even where systems for regulating the markets are implemented, there are accusations of corruption, with authorities accused of 'turning a blind eye' to the importation of sub-standard inputs and to subsequent adulteration

The most important problems for resource poor farmers in accessing good quality inputs are as follows:

1. Lack of information on appropriate inputs (and their use)
2. Limited access due to financial constraints
3. Vulnerability to unscrupulous traders who knowingly sell sub-standard quality inputs
4. Lack of availability of good quality seed
5. The lack of protection from regulations, which are not always enforced

These problems can be tackled at different levels – targeted projects or changes to policy. In addition, there are areas where further information is required through additional research. A number of interventions taken from around the world are potentially adaptable to the Bangladesh situation. Options for further work:

1. projects to increase the local availability and access (through lower prices) of good quality agri-inputs (the CARE Zimbabwe Agent scheme model);
2. projects to improve the access to commercial credit to increase the access to inputs (for example the Centenary Rural Development Bank, Uganda);
3. projects to increase the availability of good quality seed (the Nepalese Seed Sector Support Programme)
4. projects to increase access to good quality inputs through local group action (such as bulk purchasing).
5. improving the monitoring and enforcement of regulation relating to input quality, possibly using local organizations and community groups.
6. improved information for farmers and traders on input quality and on the correct application procedure and rates for agri-inputs (in particularly pesticides).
7. further research into the extent of poor quality inputs, and the effect on productivity.

## Acronyms and glossary

BADC	Bangladesh Agricultural Development Corporation
BAU	Bangladesh Agriculture University
BCIC	Bangladesh Chemical Industries Corporation
BRRRI	Bangladesh Rice Research Institute
DAE	Department for Agricultural Extension
DANIDA	Danish International Development Agency
DFID	Department for International Development
HYV	High yielding variety
NGO	Non-Governmental Organisation
NRI	Natural Resources Institute
NSB	National Seed Board
RDRS	Rangpur District Rural Support
PETARRA	Poverty Elimination Through Rice Research Assistance
PPD	Plant Protection Department.
SSP	Single Super Phosphate
TSC	Thana Sales Centre
TSP	Triple Super Phosphate
USAID	United States Agency for International Development

### Glossary

<i>Aman</i>	Wet season paddy crop
<i>Aus</i>	Late dry season / early wet season paddy crop
<i>Boro</i>	Dry season paddy crop (irrigated)
<i>Hut</i>	Market place
<i>Paddy</i>	Unmilled rice

## Introduction

### *Background to the project*

After the launch of PETRRA in 1999, a series of stakeholder consultations took place in a number of target districts aimed at developing research priorities. In November 1999, discussions were conducted in the districts of Khulna, Bagerhat and Satkhira in south-west Bangladesh with farmer groups. These identified a number of key issues raised by resource-poor rice farming households which required further investigation. Several of these related to input markets and farmers' access to good quality purchased inputs (seed, fertilizer and pesticides)<sup>1</sup> together with information on their appropriate use. Specific issues that farmers prioritized with reference to the cultivation of rice were:

- The lack of supply of good quality seed;
- The lack of knowledge concerning fertilizer and pesticide use; and
- The lack of trusted agencies supplying inputs.

Based on these findings, PETRRA commissioned this project to investigate these issues in greater depth. The project ran from January to September 2001 and was conducted by a team of socio-economists<sup>2</sup>. In addition, field support was provided by local NGOs: RDRS (Rangpur) and Shoshilan (Satkhira). This report documents the findings and recommendations of the research team.

### *Objectives of the research:*

- to identify and understand the factors which influence access to good quality inputs by resource poor rice farming households;
- identify possible options to improve access to good quality inputs by these households; and
- increase the capacity of BRRI staff to conduct marketing research.

### *Approach*

At the beginning of the project, a decision had to be taken as to the most suitable approach to take to achieve the above objectives. What was clear from the outset was the essentially qualitative nature of much of the information to be collected. Many of the issues under investigation in this project were difficult to quantify, and required a different approach to the research. Questionnaire surveys were included, though the sample size was relatively small (120 farmers). Alongside these questionnaire surveys, less formal research tools were employed to try and get to the bottom of the complexity of input markets and farmers' interaction with these markets. The objective was not to quantify and statistically analyse, but to identify and understand farmer and market behaviour.

---

<sup>1</sup> The research was limited to these three commodity groups. This is not to say that there are no problems with quality of other purchased inputs (irrigation water and equipment, other agricultural machinery and equipment), but it was seed, fertilizer and pesticides which farmers raised as specific concerns.

<sup>2</sup> The team consisted of: Andrew Goodland (Natural Resources Institute), Dr. W.M.H Jaim (Bureau of Socio-economic Research and Training at the Bangladesh Agricultural University), Dr. M.A. Jabber (Agricultural Economics Division of the Bangladesh Rice Research Institute) and a team of researchers from the BRRI Agricultural Economics Division.

Activities were conducted at the farm, market and policy levels. At the farm household level informal focus group discussions were complemented by a questionnaire survey to assess perceptions of quality and constraints to improved access to good quality inputs. At the market level, rapid market assessment tools were employed to determine market structure and marketing behaviour and to identify potential market inefficiencies. This consisted of semi-structured interviews with market participants at different levels of the marketing system. (At the outset of the project, training was provided to BRRRI staff and to the staff of other relevant organisations (mostly NGOs) in marketing systems analysis to meet the third objective listed above.) At the policy level, key organisations were approached to provide an overview of the policy environment and to identify possible scope for reform and development. Prior to conducting any of these activities a review of relevant literature both in Bangladesh and in other countries was undertaken, and this review of previous research and documentation continued throughout the project as new avenues were explored and relevant projects and reports were identified. The project concluded with a seminar to present and discuss project findings and recommendations.

#### *Organisation of the report.*

The report will begin with a discussion of the main issues which the research investigated. This is followed by the results of the field research. After summarising the main findings the report concludes with an exploration of options and recommendations for further work.

## **Section One: The context and main issues.**

Before describing the research findings, it is necessary to introduce the main issues which the project is addressing. The first point to make is that the input markets in Bangladesh have evolved considerably over the past twenty years with a general trend of liberalisation. With the withdrawal of the state from marketing activities, a number of key issues arise: what are the appropriate roles of the private and public sector in liberalised markets?; what are the potential problems which can lead to market failure and inefficiencies in liberalised markets, including quality and farmer access? and, what factors influence the efficiency of markets when the public sector withdraws? This section aims to explore these questions in greater depth.

#### *History of input market liberalisation in Bangladesh<sup>3</sup>*

Prior to 1980s, the production, importation and distribution of agricultural inputs was conducted by the Bangladesh Agricultural Development Corporation (BADC), a public parastatal originally established in 1963. Private sector activity was severely restricted with BADC having a virtual monopoly over the markets, and in addition prices were largely fixed (subsidised) by government. However, the system was not without its problems: it was expensive to run and very inefficient. Donors seized on this, and in the pro-market international environment of the 1980s, it was mainly donor pressure which

---

<sup>3</sup> The section is largely based on Raisuddin Ahmed (2000) *Liberalization of Agricultural Input Markets in Bangladesh*, in Ahmed, R., Haggblade, S. and Chowdhury, T. (eds) *Out of the Shadow of Famine*. John Hopkins University Press, Baltimore.



led to the gradual roll back of BADC and government involvement in markets, both as a distribution agent and also in fixing prices.

### Fertilizer

Fertilizer is critical to rice production. The use of chemical fertilizers is widespread in Bangladesh, including resource poor paddy producing households. The major nutrients in use include nitrogen (urea), phosphate (TSP & SSP) and potash (MP). Other micro-nutrients are used in much lower quantities, including zinc, gypsum and sulphates. There has been a rapid growth in inorganic fertilizer use since it was first introduced in the 1950s. Shahbuddin and Zohir (1994) attribute the increase to three distinct factors: the increased cultivation of High Yielding Varieties of rice which require greater agricultural inputs; the policy reforms which have liberalised the marketing of fertilizers; and finally, the wide availability of fertilizers in Bangladesh due in large part to the country's capacity to produce urea.

Prior to 1978, BADC had the sole responsibility for the procurement of all fertilizers either from state-owned factories or imported fertilizers from abroad. A complex distribution system was set up, with fertilizers channeled through to Thana Sales Centres (TSCs). Below this level, local private village retailers were allowed to purchase and sell fertilizers on to farmers, though had geographical limits to where they could sell and had to sell at pre-determined set prices, which included a fixed margin.

Since 1978 there has been a process of increasing private sector involvement in the market under USAID funded FDI-I and FDI-II programmes. The aim of the programmes was to privatise marketing and distribution to improve market efficiency and promote entrepreneurship. This culminated in 1991, when private sector imports of fertilizer were legalized. By the mid-1990s, the private sector accounted for more than 96 percent of urea distribution, with BADC distributing the remainder. Since liberalisation began it is estimated that more than 100,000 entrepreneurs have entered the fertilizer market. Urea made up 72 percent of fertilizer distributed in 1991-2, with phosphate making up over 20 percent. These two products dominate the fertilizer market.

The gradual reduction of BADC in fertilizer markets began in the late 1970s when it withdrew from thana level distribution, and left this to private agents. Geographical restrictions on movement were lifted in the early eighties (with the exception of border areas), and during the same period prices were deregulated. In the late 1980s there was a further reduction of BADC's involvement as it withdrew from district level distribution, with traders then able to purchase directly from factories and ports, though they were not permitted to import until 1992. By this time, although the production of urea, the most commonly used fertilizer, remained under state control through BCIC, the distribution of fertilizer was entirely liberalised.

The reforms suffered a setback in the 1994/5 boro<sup>4</sup> production season when there were severe shortages of urea. Where the blame for this lies remains disputed, but the response

---

<sup>4</sup> The two most important paddy cultivation seasons in Bangladesh are Aman and Boro. Aman paddy is cultivated over the monsoon season from approximately July to November, when it is harvested. The main

of the government was to re-introduce controls for urea distribution. At the time, traders were accused of hoarding urea to create shortages (though traders argue that production shortfalls and government exports of urea were to blame), and to combat this, urea distribution to the district level is now on a monthly quota system, with only licensed dealers allowed to access the urea. Since the 1994/5 crisis there have been no further shortages.

Other than urea, the majority of fertilizers are imported privately. Another mini-crisis occurred in 1999 with the mis-selling of Single Super Phosphate (SSP) as Triple Super Phosphate (TSP) which are virtually indistinguishable to the naked eye. The government acted quickly and banned the importation of SSP. Apart from this ban, the fertilizer market (other than urea) is free.

There is a conflict of opinion on how well the new private marketing system is operating. The PETRRA stakeholder analyses found that the market wasn't delivery good quality fertilizer to small farmers, though USAID claims the system is working well: "The privatized system is more responsive to markets and customer needs, and prices are intensely competitive. Distributors make timely, reliable deliveries, provide good dealer service, and anticipate farmers' needs and demands. Competition is strong all along the marketing chain and in every part of the country. Margins are small, and distributors and dealers constantly seek ways to minimize costs. As a result of this more efficient marketing system, costs to farmers are considerably lower" (USAID 1996). Fertilizer sales have increased from 750,000 tons in 1978 to 2.3 million tons in 1993.

USAID (1996) claim that increased efficiency has been achieved by the following developments in the fertilizer markets:

- Direct purchases of urea from the factories by private agents, and of phosphate and potash from the port, have produced major cost savings all along the marketing chain.
- The Bangladesh Chemical Industries Corporation, which owns and operates the urea factories, is now paid in cash for its fertilizers, improving its cash flows. Under the old system government payments were frequently delayed.
- Private distributors pay less than BADC did for barge transportation, the main form of transport from ports and dealer warehouses.
- Inventory management is easier under private distributors and dealers, who purchase in smaller lots and choose warehouse locations that reduce transport costs and make fertilizer more accessible to retailers and farmers.
- Direct private imports (which were allowed after 1991) have reduced the costs and freight price of fertilizer by 8 percent.
- Since 1989, competition has kept the margin between the issue price from factories or distribution points, and the farm price below 20 percent for urea and phosphate and 25 percent for potash, which is sold in smaller quantities. When the issue price increases unexpectedly, private distributors and dealers generally absorb part of the increase, then gradually raise the margins back to competitive but profitable levels.

---

marketing season for Aman begins in November and continues until March or April. Boro is the dry season rice crop requiring irrigation, which is grown from approximately February until May. The marketing season for Boro lasts from May until August.

- Farmers now get the kind of fertilizer they want, in the quantities they want, at the time they need it. Previously, BADC was unable to project demand or anticipate local shortages, so the fertilizers available at a given site were often not those the farmers demanded.)
- Because of training provided under FDI-2, fertilizer dealers are now a key source of technical advice to farmers. Under BADC, most fertilizer retailers had little or no technical knowledge of how fertilizers should be applied.

The privatization of the fertilizer market appears from the above account to have been successful and has certainly contributed to the massive increase in the use of fertilizers by farmers, including smaller, resource poor farmers. Although no data sources are provided to back up the above claims, there is general agreement in the literature that the markets operate efficiently (Shahabuddin and Zohir (1994), USAID (1996), Ahmed (1998)). However, some of the findings clearly conflict with the findings of the PETRRA stakeholder consultations. Small resource poor farmers still lack technical information on the selection and use of fertilizers. More importantly, even though the local *availability* of fertilizers has improved since privatization, this does not necessarily mean that *access* has improved for resource poor farmers. This is an issue taken up below.

### Pesticides

The pesticide market has a rather different history to fertilizers, with relatively little public sector involvement. Since the later 1960s, the procurement and distribution of pesticides have been conducted mainly by private agents. The reason for the lack of government involvement has been put down to the complexities of storage and handling, and the difficulty in responding rapidly to pest outbreaks (Ahmed, 2000). The Ministry of Agriculture did play a role however, and limited the imports to specified brands and also required dealers to be licensed. In the late 1980s, the limitation on brands was withdrawn, and although bans exist for certain pesticides with negative environment and health impacts, the trade in pesticides is fully liberalized.

### Seed

Farmers use both seed and seedlings for paddy cultivation. Seeds are normally preferred, with farmers only resorting to using seedlings if they have experienced problems with cultivating from seed. Four main sources for seed are available to farmers: their own production of seed kept over from a previous harvest; BADC supply of certified seeds; private traders; and seed purchased from other farmers. Of these, farmers' own seed was by far the largest source for paddy seed in research published in 1993, accounting for 100 percent of local varieties, and 95 percent of HYVs, with remainder provided by BADC (Zohir 1993). One possible reason why the private sector plays such a minor role is that BADC production and distribution of seed may be subsidised. BADC operate through more than 2000 dealers distributed countrywide.

Although farmers using their own seed is the most common source of seed, it is not without its difficulties. Although the storage of aman rice seed (usually traditional varieties) presents no problems, farmers typically find that boro rice (usually HYVs) only stores well for a few months. To overcome this difficulty, farmers with access to suitable

land will grow an additional boro seed crop during the traditional aman cultivation season. Even though this strategy allows access to seed, regenerating seed in this way may compromise quality and farmers recognise that boro seed bought from a reputable agency may be of better quality. However, the problem is that farmers do not have access to trusted agencies.

Informal seed markets, where farmers produce and sell seed in local markets has traditionally been the most common form of seed marketing, and one in which the state plays no role. Although the majority of seed that farmers use is home produced, the government plays an important role in the development, multiplication and release of new seed varieties. Up until the late 1980s, this was sufficient to meet the country's needs. However, with increasing numbers of hybrid and high yielding varieties being developed internationally, the import of seed has been partly liberalised. A number of companies are now permitted to import and multiply seed, for rice and other crops, though all rice released must be certified.

To summarise, input markets in Bangladesh are now more or less open. Public sector organisations still play a role in the production and distribution of rice seed and urea, but other markets are free from direct state intervention, though the state must still play a role in the provision of public goods and regulation. The respective roles of the public and private sectors are taken up in the following section.

#### *Appropriate roles of the public and private sectors*

Liberalizing markets places new demands on public and private sectors. When a government decides to open markets, the hope is that the private sector will fill the void left and perform those services previously provided by public sector organisations. With respect to input markets, these services include the procurement and distribution of products. However, in addition to this direct service provision, in regulated markets the public sector normally also plays a role in setting prices and in ensuring the quality of the products distributed. A well-functioning input market, whether publicly or privately run has three major requirements:

1. the **availability** of inputs when and where farmers require them;
2. a fair **price** for the inputs (i.e. a price which reflect the international costs of production plus a reasonable profit margin);
3. products which meet **quality** standards

The state has a vital function in meeting these requirements, and the performance of the state in this function will determine the extent to which farmers' needs are served. A marketing system in which the government has absolutely no involvement, direct or indirect, runs the risk of not achieving any of the above requirements.

#### Availability:

In general the private sector will provide goods and services where there is sufficient demand to make it profitable. A common problem in instances where the farmers are widely spread and difficult to reach is that the costs of distribution increase. In addition, where farmers only demand a small amount of an input and if there are relatively few customers in a location, the aggregate demand is low. High costs and low demand will

dissuade the private sector from providing a service and the government will need to consider how to service such farming households. However, with reference to Bangladesh, this is unlikely to be a major problem as the country has relatively good infrastructure (except for in the wet season), and the country is densely populated.

### Prices

Markets generate prices in liberalized economies. If markets are competitive, input producers will maximize their profits and incomes by producing those commodities which farmers most desire and can pay for, and they will do so at least cost. Likewise, all market participants will act 'rationally' and attempt to maximize profits whilst minimizing cost. The conditions for perfectly competitive markets include assumptions of a sufficient number of buyers and sellers, freedom of entry, absence of monopolies or monopsonies, perfect and equal access to information. The absence of any of these assumptions will lead to market inefficiencies with potentially negative consequences for producers and consumers. Improvements in efficiency will reduce the cost of marketing and the marketing margins of participants thus increasing producer prices and/or lowering consumer prices.

The performance of a marketing system can be viewed in terms of economic efficiency. Although this is difficult to measure accurately, it can be assumed that high levels of competition in a market should provide the incentives to improve firm level and system wide efficiencies. The government plays a role in achieving this through a number of means:

- facilitating the entry of new participants (eg, wholesalers, importers, retailers) into the market, for instance by simplifying and reducing the cost of licensing.
- increasing the availability of market price information;
- providing infrastructure such as roads and market facilities.

### Quality:

Poor quality inputs will affect their performance and reduce productivity. Farmers may be sold poor quality inputs either intentionally, by opportunistic suppliers who are exploiting their greater knowledge of the products, or unintentionally by suppliers who lack awareness of quality issues. Information is key to quality. Where the input retailer has more knowledge of the product than the farmer, then there is a danger of exploitation. Government must play a role in providing information. Education of both input agencies and farmers may improve the awareness of quality issues. Quality of inputs may be compromised at specific points in the supply chain (for example bad storage practices for chemicals), requiring more specific training.

Government also has a role to play in ensuring that appropriate quality standards are developed and applied to protect farmers purchasing seed, fertilizers and other inputs. This requires that standards for quality are developed, monitored and enforced.

In summary, the government plays an important role in input markets both through the direct provision of services (such as seed dissemination, and extension services) and

through providing an appropriate regulatory framework and economic conditions to encourage the development of efficient markets.

There has been much debate about the appropriate role for the public sector in service provision. (see Griffith et al, 1999). Clearly, a balance is required between the public and private sectors, the state and the market. The state has fundamental economic and social roles, whilst the private sector and the market remain important to increase economic efficiency and growth. The state and the market are complementary. There is a growing consensus in donor organisations for a partnership approach to service provision, with the state working together with NGOs, the commercial sector and people's organisations, with the comparative advantage of each being exploited by the others (Farrington and Carney, 1996).

There remains a strong need for continued state involvement in protecting the poor and providing services for the poor. With well functioning agri-input markets, local availability of goods should not be a problem, though access to quality inputs by resource poor farmers may require state intervention, both to improve access and to improve the quality of available inputs. The low purchasing power of the poor, the difficulty in physically reaching some or many of the poor, and the relatively small quantities of goods and services demanded by the poor will tend to dissuade the private sector from servicing the poor.

#### *Markets and transaction costs*

In the above section, the role of information provision by government is a recurring theme. Farmers are particularly vulnerable to poor quality information and information asymmetries, when one side of an exchange has more information than the other (for example on quality, on prices or on quantities). The problem of information is exacerbated by weak legal systems in which it is difficult to prosecute anyone who is knowingly exploiting information, for example by selling a farmer sub-standard inputs, over-priced inputs or underweight inputs. With inadequate information, poor monitoring systems and weak contract enforcement, farmers are vulnerable and dependent upon trust (of individuals and brands). Where there is little trust, farmers may be sold poor quality inputs, they may reduce the amount of inputs they use, or they may over-use inputs, resulting in lower productivity and possible environmental damage.

A central concept in this project is trust. Trust is a vital element of exchange. The two parties in a transaction, for example a farmer and a fertilizer dealer, need a level of trust which reduces the risk that either will not honour the agreed terms of exchange. Trust is closely related to the concept of transaction costs and New Institutional Economics, which provides the basis for understanding market access and market institution issues. New Institutional Economics (NIE) argues that institutions have arisen as a response to transaction costs as institutional innovation is key to minimizing transaction costs. These can be divided into ex-ante and ex-post transaction costs. Ex-ante transaction costs include the costs involved with gathering information about the other party in the transaction and the goods or services being exchanged. This includes information about the prevailing price and about the reputation of the potential trading partner to deliver on

a contract. Costs will obviously be lower when something is already known about the other party or about the good or service being exchanged. The level of trust between parties is critical in determining the level of transaction costs. The more trust there is between parties, the less the need to invest in information gathering. For this reason, many exchanges take place between parties (people or organizations) which are known to each other, either from repeated exchanges or from personal relationships such as friends, kin, caste or tribe.

Ex-post transaction costs are the costs of monitoring and enforcing a contract which has a time element, i.e. a transaction that is not an 'on-the-spot' exchange. This will include credit arrangements (including advance and delayed payment for goods and services), sharecropping and employment. The costs of monitoring and enforcement are increased for the individual when mechanisms are lacking to enforce contracts, as in rural Bangladesh where there is little legal support. Transactions conducted over a period of time therefore increase the likelihood of one of the parties reneging on the contract, the consequently increase the level of information which is required by the parties prior to entering into the contract and monitoring the other party during the course of the contract. This may be a factor in agri-input markets in Bangladesh, as farmers may receive some inputs on credit from retailers.

Without trust, there is risk. For farmers this will include the risks of being overcharged, being sold inferior quality or the wrong variety, being sold a lower volume or weight or being given poor advice on usage. Traders also run risks in selling to farmers. The risks for the trader are the possibility of losing the business of the farmer, developing a bad reputation or being charged by the authorities.

#### *What is access to good quality inputs?*

For the above sections, we can see that 'access' can be broken down into different components. Firstly, the product (in this case fertilizers and seed) has to be physically available to farmers – i.e. within reasonable distance from rural communities. Where a product is marketed by the private sector, this implies that the market operates efficiently so as to deliver the product to those places where it is demanded. However, availability in itself is not sufficient for access. Farmers need to have the means to acquire the product, whether paying with cash or exchanging for another good or service. Obviously, a higher priced product will reduce access. A further aspect of access is the relationship the farmer has with the seller, which may affect the price, quality and quantity of the product that is traded.

Poorer households may face shortages of money at the time when input purchases are made, and access to inputs is typically closely related to access to credit markets. There may become trapped into a situation in which they borrow to purchase inputs, loans which need to repaid immediately after harvest, requiring farmers to sell paddy when prices are at their lowest (Crow and Murshid, 1994). This prevents sufficient accumulation of income to pay for the next season's inputs and, if inputs are required on credit, it may limit the sources of inputs for smaller farmers. This may point to NGOs or

financial organisations providing a loan product which is suited to input provision, and that does not force the farmer to sell stocks immediately after harvest.

In addition, the PETRRA stakeholder analysis suggests that access to inputs for farmers may depend on developing close relationships with suppliers – there is pervasive mistrust of agents. As a consequence the reputation of the seller is important and transactions are frequently personalized. Again, this limits the choice of input supplier for farmers, and is an important consideration for the design of interventions.

#### Access and livelihoods

In recent years, a broader livelihood perspective has been applied to rural households and communities to understand better the factors which influence their poverty. Central to this approach is the recognition of a number of household assets and how these affect livelihood strategies. This is of interest to this research, as the levels of assets does heavily influence farmers' access to inputs. Two main assets are of importance. Firstly, financial assets, which are self-explanatory. Households with more financial assets can afford to purchase more and better quality inputs. Secondly, social capital.

#### Social capital

This is a measure of the strength of relations that people have with others (family, friends and people inside and outside their communities. According to Carnay (1998), social capital is "the social resources (networks, membership of groups, relationships of trust, access to wider institutions of society) upon which people draw in pursuit of livelihoods". These resources are particularly important to small and medium scale paddy producers in Bangladesh, because sufficient and good quality social capital can partly substitute for the lack of other assets (especially physical and financial capital). Small farmers rely heavily on their social network to have access to means of production, credit, and employment. For example: a farmer who is on good terms with a banker is more likely to receive a bank loan, or a farmer who is on good terms with an input retailer is more likely to get good quality inputs or inputs on credit.

This section has attempted to describe the relevant issues relating to the access to good quality inputs for resource poor farming households. The following section will describe the findings of the research with respect to these issues.

## **Section Two: Farmer survey findings**

#### *District and site selection*

In this section we will describe the findings of our fieldwork. The fieldwork consisted of activities conducted in four districts of Bangladesh: Satkhira and Khulna in the south west; and Lalmonirhat and Rangpur in the north west. The choice of districts for the work was guided initially by PETRRA priorities. The south west area is a focus region for PETRRA, and it was in this region that the problems relating to input markets were raised by poor farmers initiating this research. To compare the findings from the south west



with other parts of the country a second region was chosen. In selecting a second region for the study, the research team aimed to identify an area in which the dominant economic activity was rice cultivation, though far enough from the south west not to be influenced by local marketing networks. The north west region of Rangpur fitted these criteria. Two districts were selected in each region, to explore whether there were significant differences between farm households and input marketing systems located close to the Indian border, where legitimate and illegitimate cross-border trade in inputs was likely to be more common. On this basis Satkhira, on the south western border with India, and Lalmonirhat, on the north western border, were selected for survey work.

From these districts, a total of six villages were selected, two each from Satkhira and Khulna (because of the focus of the work on the south west of Bangladesh), and one each from Rangpur and Lalmonirhat. In selecting villages from these districts, poverty as well as rice producing areas were taken into consideration. Discussions were held with local NGOs and officers from the local branches of the Department for Agricultural Extension to identify thanas which were disadvantaged and had high levels of resource poor rice farming households, though had rice based cropping patterns. The villages selected were Kulbaria Boratia and Atlia under Atlia union of Dumuria thana in Khulna district; Kayemkhola and Mirpur under Kmuria union of Tala thana in Satkhira district; Dokhin Dologram under Dologram union of Kaliganj thana in Lalmonirhat district and Latifpur under Latifpur union of Mitapukur in Rangpur district.

#### Activities.

Two activities were conducted in the selected villages. Initially, informal groups of farmers were gathered to discuss their perceptions regarding the use of and access to agri-inputs. Checklists were drawn up to guide these discussion sessions. This gave the research team an initial insight into the issues which the project was exploring, and helped to inform the content of a questionnaire. The second activity was the questionnaire survey. For this, from each of the 6 villages, 20 farmers were selected randomly from a population list prepared with some bias to include mostly poor farmers. Therefore, altogether 120 farmers were included in the survey.

## *Results from farmer surveys*

### Household characteristics

The initial task was to categorize the farmers according to levels of poverty. This is potentially a very complex procedure, and as result we instead went for a simple proxy indicator of poverty - the major source of household income and farm size. All farm households surveyed listed crop cultivation as their major economic activity, and so farm size was a reasonable proxy for poverty<sup>5</sup>.

*Table 1: Farm size by district*

<b>District</b>	<b>No. of farmers</b>	<b>Average farm size (hectares)</b>
Khulna	40	0.51
Satkhira	40	0.68
Lalmonirhat	20	0.91
Rangpur	20	0.93
<b>All</b>	<b>120</b>	<b>0.70</b>

*Table 2: Categories of farmers*

<b>Farm size</b>	<b>No. of farmers</b>	<b>% of farmers</b>
Marginal (up to ½ hectare)	53	44
Small (more than ½ hect. to 1 hect.)	47	39
Medium & large (more than 1 hect.)	20	17
<b>All</b>	<b>120</b>	<b>100</b>

Tables 1 and 2 show the distribution of farm size by district and the different poverty categories they fall into. The focus for our work was resource poor rice producing households – those farmers falling into our marginal and small categories. These made up 83 percent of our surveyed farm households.

### Cropping Patterns

Rice is the dominant crop for all districts and farm categories, and within rice, HYV Aman and HYV Boro were the most important. This can be seen from Table 3 which shows that rice cultivation accounted for at least 79 percent of total crop production in all four districts, with HYV aman and HYV boro accounting for an average of 39 and 35 percent of total land under crop production respectively.

---

<sup>5</sup> The research recognise the imitations of this approach – the amount of land available to a household is not the sole determinant of a household's economic status. For example, land will vary in quality and productivity according to agro-ecological conditions; also households vary in size and composition and have different minimum income and food requirements.

Table 3. Importance of rice in yearly crop cycle by districts

Crops	Khulna		Satkhira		Lalmonirhat		Rangpur	
	Area (ha)	%	Area (ha)	%	Area (ha)	%	Area (ha)	%
Local aus	0.01	0.9	0.00	0.4	0.00	0.0	0.00	0.0
HYV aus	0.07	7.8	0.00	0.4	0.00	0.0	0.01	0.8
Local aman	0.06	6.5	0.07	7.7	0.12	8.1	0.07	4.2
<b>HYV aman</b>	<b>0.31</b>	<b>35.0</b>	<b>0.29</b>	<b>30.2</b>	<b>0.60</b>	<b>42.1</b>	<b>0.74</b>	<b>47.1</b>
Local Boro	0.02	2.8	0.01	0.9	0.00	0.0	0.00	0.0
<b>HYV boro</b>	<b>0.22</b>	<b>24.9</b>	<b>0.40</b>	<b>41.3</b>	<b>0.62</b>	<b>43.2</b>	<b>0.47</b>	<b>29.6</b>
Hybrid boro	0.01	1.4	0.00	0.0	0.00	0.0	0.00	0.0
<b>Total rice</b>	<b>0.71</b>	<b>79.3</b>	<b>0.78</b>	<b>80.9</b>	<b>1.33</b>	<b>93.4</b>	<b>1.28</b>	<b>81.7</b>
Jute	0.13	14.7	0.07	6.8	0.05	3.7	0.13	8.4
Others	0.05	6.0	0.12	12.3	0.04	2.9	0.16	9.9
<b>Total crop area</b>	<b>0.89</b>	<b>100.0</b>	<b>0.97</b>	<b>100.0</b>	<b>1.43</b>	<b>100.0</b>	<b>1.57</b>	<b>100.0</b>

#### Fertilizer:

##### Fertilizer use

Urea and TSP are the most commonly used inorganic fertilizers. Of the rice crops, HYV Boro requires the most fertilizer. Interestingly, fertilizer use is very similar across all farm size categories (see table 4), and close to recommended quantities. This shows the importance attached to farmers of using fertilizer and also indicates that farm size does not appear to be a constraint to access. What is more interesting is that even though fertilizer use was fairly similar across farm sizes, small and marginal farmers were more inclined to believe that they were **not** using a sufficient quantity (70 percent of marginal farmers believed they used sufficient quantities of fertilizer compared to 85 percent for medium and large farmers). This may be an indication that smaller farmers receive lower quality fertilizer than larger farmers, and therefore feel that they should use more.

Table 4: Use of fertilizer for boro by farm size groups (kg. per bigha)

Type of fertilizer	Marginal farm	Small farm	Medium & large farm	All
Urea	28.15	27.71	30.62	28.39
TSP	14.94	15.63	15.12	15.24
MP	7.70	7.85	6.90	7.62

With regards to the correct use of fertilizer and information of application techniques and rates, marginal farmers are more reliant upon other farmers for this information, whilst larger farmers depend on 'institutional' sources of information such as the DAE, and also information from fertilizer dealers. This is an important point: the effectiveness of

fertilizer use is closely associated with good crop management and proper application of fertilizers. Farmers may believe that the fertilizer they are using is of low quality, when in fact the poor performance of the fertilizer is due to incorrect application. The better the sources of information, the better the application practices and the better the effectiveness of the fertilizer.

#### Access to fertilizers

Local stores (i.e. retailers within the local village or market) are the most common source for fertilizers for all categories of farmers. As mentioned above, the majority of farmers believe that they purchase sufficient quantities of fertilizers, though with 30 percent of the marginal farmers wanting to purchase more. The main reason for not purchasing more is, understandably, shortage of cash. Note that the availability of fertilizers was not mentioned by any farmers – fertilizers are **available** but not always **accessible** due to cash shortages. Many farmers are therefore dependent upon buying fertilizers on credit – over 20 percent – in all farmer categories. Apart from those farmers requiring credit, others are neither loyal to one store or to any brand, and generally select their retailer on the basis of price. Again, this is interesting as farmers are aware of potential quality problems in fertilizers (see below) but do not appear to trust any particular retailer to sell them good quality. This absence of trust, as described in Section 1, has potentially serious consequences for the access to good quality inputs.

#### Quality of fertilizers

A significant 65% of small and marginal farmers were not confident of purchasing good quality fertilizer (see table 5). This is a disturbing figure, and clearly demonstrates the extent of quality fears. One of the key factors is that quality can only be assessed on visual appearance, though this is unreliable. Over half of the farmers interviewed believed that fertilizers are adulterated, which was blamed on retailers and other traders (i.e. not manufacturers). Again, this underlines the lack of trust that farmers have of retailers. The majority of farmers who do return to the same retailer for purchasing fertilizer do so not because they trust the retailer, but because that retailer is willing to advance inputs on credit.

*Table 5: Farmers opinion about their ability to ensure they purchase good quality fertilizer.*

Response	Marginal farms		Small farms		Medium and large farms		All	
	No. of farmers	%	No. of farmers	%	No. of farmers	%	No. of farmers	%
Yes	20	41	13	29	9	50	42	38
No	29	59	32	71	9	50	70	62
Total	49	100	45	100	18	100	112	100

## Pesticides

### Pesticide use

Again, we found high usage of pesticides by all farmer categories, with 88 % of farmers believing they are using sufficient quantities. This may seem surprising given the cash constraints facing many smaller farmers. However, the quantity of pesticides used masks their quality - most farmers, and in particular smaller farmers, are using cheaper brands which are of lower quality, including smuggled pesticides (from India). Farmers on the whole are far less well informed on the use of pesticides and therefore are more dependent on information from dealers and retailers of pesticides, and the instructions which normally appear on the bottles. The main types of pesticides used are shown in Table 6. It is interesting to note that the most frequently used pesticide is Dimecron, which has just been banned by the government and will not be available to farmers in the future [check].

*Table 6: Main types of pesticides used for paddy production*

Pesticide	Aus		Aman		Boro	
	No.	%	No.	%	No.	%
Basudin 10G	5	22	19	18	19	18
Furadan 3G, 5G	3	13	25	23	26	25
Dimecron 100WSC	10	43	73	68	75	71
Pilacron 100WSC	7	30	18	17	22	21
Sumithion 100EC	0	0	15	14	15	14
Total no of farmers	23		107		106	
As a whole 116 ( 97%) of farmers used pesticides in their paddy out of the total sample farmers (120).						

### Access to pesticides

As with fertilizers, many farmers (26%) are dependent upon credit for purchasing pesticides and 30% of farmers said that this was their most important factor in selecting a retail outlet (see Table 7). Even with credit, most farmers are unable to afford the best quality pesticides (made by international companies). There is a much wider price range for pesticides than for fertilizers, which reflect the many different brands which are available. Price is the most important factor in selecting a retail outlet and also the choice of pesticide. Generally, the most expensive brands (and those considered by farmers to be of the best quality) are made by well-known international companies such as Aventis and Syngenta. Cheaper brands are locally produced pesticides or those imported (legally) from India. Cheaper still are pesticides smuggled from India (some of which may be banned in Bangladesh). Half of the farmers interviewed stated that smuggled pesticides are available in local markets and in villages.

As with fertilizer, the reputation of the retailer is not an important consideration in purchasing pesticides.

Table 7: Most important factor for choice of source of fertilizer purchase

Item	All	
	No.	%
Price	46	40
Distance	10	9
Reputation of the seller	7	6
Expired date of the pesticide	21	18
Appearance of the pesticide	0	0
Purchase on credit	30	26
Other factors	1	1
<b>Total</b>	<b>115</b>	<b>100</b>

#### Pesticide quality

Some 25% of farmers reported quality problems with pesticides, a higher figure than for fertilizers. This reflects the difficulty for farmers to judge the quality of pesticides. Trust again is all that farmers can rely upon to access good quality pesticides, though 40% of farmers believed that pesticides were adulterated. Quality is generally closely related to price in pesticide markets, which farmers recognize. International brands are considered to be of far greater quality than local or Indian brands. The one indication of quality which farmers are well aware of is the expiry date. All pesticide bottles are meant to have an expiry date, and farmers normally check this prior to purchase.

In general, farmers are very unsure about the quality of pesticide they are purchasing as shown in Table 8. This is irrespective of the category of farmer.

Table 8: Farmers' confidence in purchasing good pesticide quality

Responses	Marginal farms		Small farms		Medium and large farms		All	
	No. of farmers	%	No. of farmers	%	No. of farmers	%	No. of farmers	%
Yes	19	39	19	44	7	35	45	40
No	30	61	24	56	13	65	67	60
<b>Total</b>	<b>49</b>	<b>100</b>	<b>43</b>	<b>100</b>	<b>20</b>	<b>100</b>	<b>112</b>	<b>100</b>

The availability of smuggled pesticides has implications for quality. This is likely to include chemicals banned in Bangladesh (due to human safety and environmental damage).

Pesticide quality in general is a major concern for farmers. Both for assuring good quality and for the correct application of pesticides the farmer is heavily dependent upon the local retailer, with whom they have very little trust. The pesticides that farmers would like to purchase are beyond their means and it is this problem of lack of cash and high

prices which is the major constraint to farmers' access to good quality pesticides (see table 9).

*Table 9: Most important problems in purchasing pesticides*

<b>Problems</b>	<b>No. of responses</b>	<b>% of total</b>
Shortage of cash	37	35
Lack of trust in seller	18	17
High price	11	10
Lack of information on most appropriate pesticide (many types of pesticides are available).	18	17
Non availability of desired pesticide	11	10
Unable to read label	7	7
Others	4	8
<b>Total</b>	<b>106</b>	<b>100</b>

With regards to suggestions for improving access, farmers are most strongly in favour of increased access to credit (see Table 10). This would allow farmers to afford the more expensive, better quality pesticides produced by international companies. Greater government intervention was also mentioned, in the direct production of pesticides, provision of price subsidies and also in monitoring quality.

*Table 10: Farmers suggestions in solving pesticide quality problems*

<b>Suggestions</b>	<b>No. of responses</b>	<b>% of total</b>
Ensure credit	29	29
Government intervention in production	13	13
Limiting the types of pesticide available in the market	12	12
Increasing availability of pesticides	9	9
Farmers training	8	8
Reduce (subsidize) the price	7	7
Label should be in Bangla	5	5
Government inspection should increase	4	4
Others	14	14
<b>Total</b>	<b>101</b>	<b>100</b>

## Seed

### Sources

The sources for seed are very different than for fertilizers and pesticides because the majority of seed is home grown. In Aman cultivation, for both modern and local varieties, the majority of all seed was home grown for all categories of farmers. Of the non-home grown seed, in Khulna and Satkhira, around 10 percent of seed comes from BADC, whilst in the north west, around 25 percent is purchased in the market (non-BADC). For HYV Boro, which is the most dominant of the crops grown in all survey areas, the majority of seed is home grown. Market sources are the next most important, accounting for between 15 and 37 % of marginal and small farmers respectively. ('Market sources' describes that seed purchased in the market which has not come from institutional sources (such as from BADC or NGOs). It is normally grown by larger scale farmers and sold through local retailers.) Relatively little (less than 10 percent) of boro seed is from BADC.

Table 11: Sources of seed (by percentage for each category of farmer)

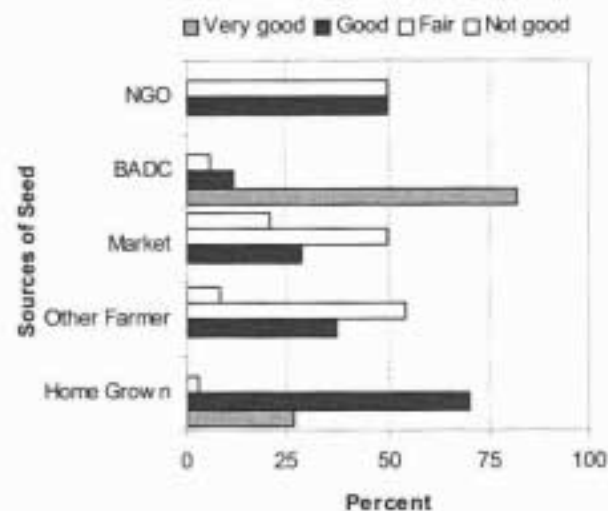
		South west area		North west area	
		Aman MV	Boro MV	Aman MV	Boro MV
<b>Marginal farmers</b>	Home	61	60	58	44
	Other farmers	11	4	9	19
	Market	17	20	33	37
	BADC	11	14	0	0
	NGO	0	2	0	0
<b>Small farmers</b>	Home	62	56	73	75
	Other farmers	15	16	7	0
	Market	13	22	20	25
	BADC	10	6	0	0
	NGO	0	0	0	0
<b>Medium and large farmers</b>	Home	56	64	90	70
	Other farmers	0	9	10	0
	Market	44	16	0	15
	BADC	0	9	0	15
	NGO	0	0	0	0



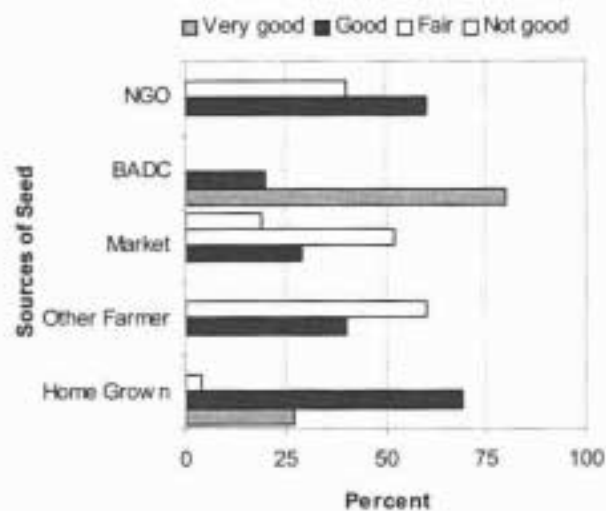
Figure 1: Farmers' perceptions of seed quality

South West Bangladesh

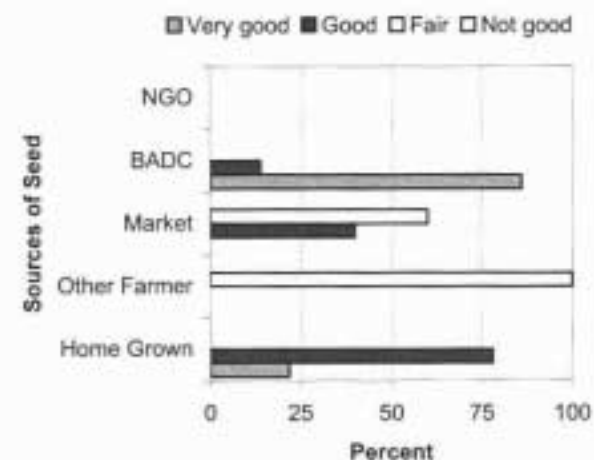
Marginal Farms



Small farms

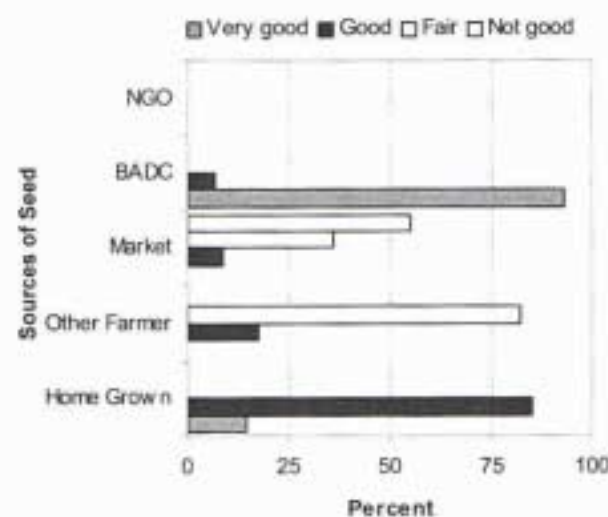


Medium and large farms

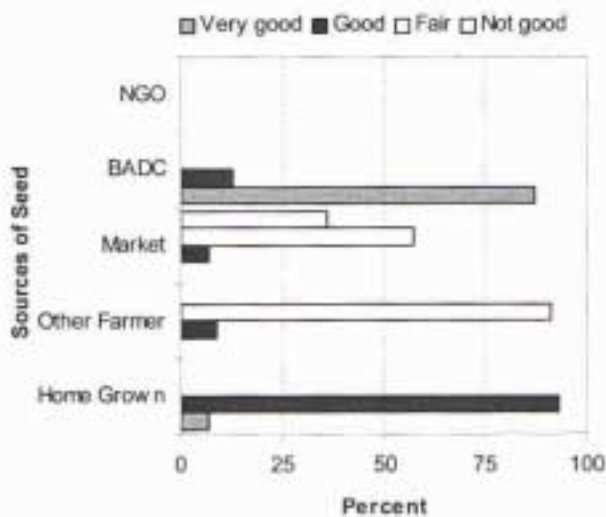


North west Bangladesh

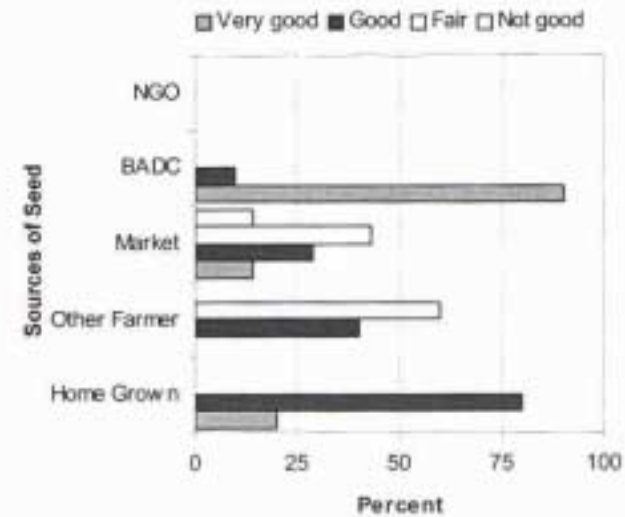
Marginal Farms



Small farms



Medium and large farms



### Perceptions of quality by source

The findings showed very clearly that BADC seed is considered the best quality in all areas. The second best source is perceived as farmers' home grown seed, whilst the third best source is from other farmers. The worst quality in all areas is the seed purchased from 'market sources'. This is illustrated in figure 1. More farmers in all areas and of all categories believe that BADC seed is of better quality than seed from any other source, though a significant number of farmers (25 percent in the south west, and 15 percent in the north west) thought that home grown seed was of very good quality. Seed from farmers sold in the market was often considered as poor quality, though the findings reveal that farmers' perceptions of market sources vary considerably. This reflects the variability of seed available in local markets, and also highlights the basic problem facing farmers – the difficulty in determining good quality from bad.

### Seed prices

The more expensive the seed, the less accessible it is, which has a higher significance for poorer farmers. Farmers' own seed is obviously the cheapest source of seed, and therefore the most accessible. Local market seed is considerably cheaper than BADC seed. Interestingly, the research revealed that the system for fixing the price of BADC seed is not working in practice. Although BADC seed is officially sold at a fixed price, traders rarely stick to this price and in practice it may be double the fixed price (up to 30 taka/kg). The demand for BADC seed, due to the recognition of the high quality, leads to shortages on the market and inflates the price beyond the means of many smaller farmers. This problem only occurs in certain popular varieties. Less popular varieties often have very low demand, and traders may even sell these at a discount. Unless traders can demonstrate that they have sold the seed they will not have access to further BADC seed.

### Choice of source

Shortage of funds often forces farmers to use their home grown seed. However, for seed that is purchased, the availability of seed on credit or paying for seed in installments, are important factors in selecting seed sources, especially for the marginal group farmers. Often farmers are left with relatively little choice – the lack of availability of BADC seed leaves farmers with no alternative but to purchase from the market (even though they know this is often poor quality) or use their own.

### Quality of purchased seed

Figure 1 above illustrates the perceptions of seed quality by source. In the questionnaire, we also asked farmers specifically about their experiences of purchasing good quality seed. The findings are shown in figure 2. This shows that 41% of seed purchased by marginal farmers in the south west, and 31% of marginal farmers in the north west was of poor quality (i.e low performance / germination rate). For small farmers, 28% of the seed they purchased was of poor quality in all areas.

Figure 2: Percentage of seed purchased by farmers (from all sources) considered to be of low quality (low germination rates)

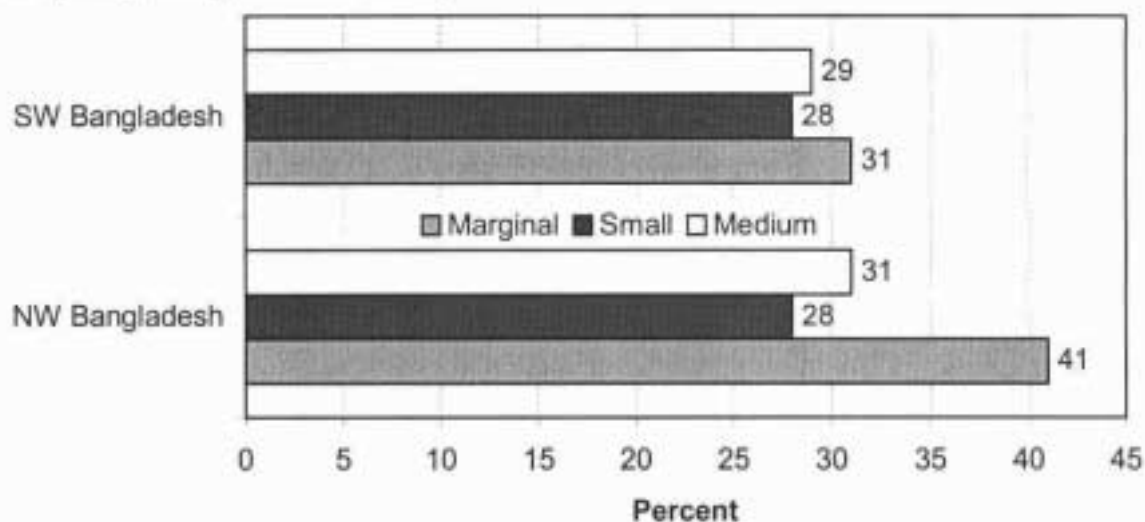
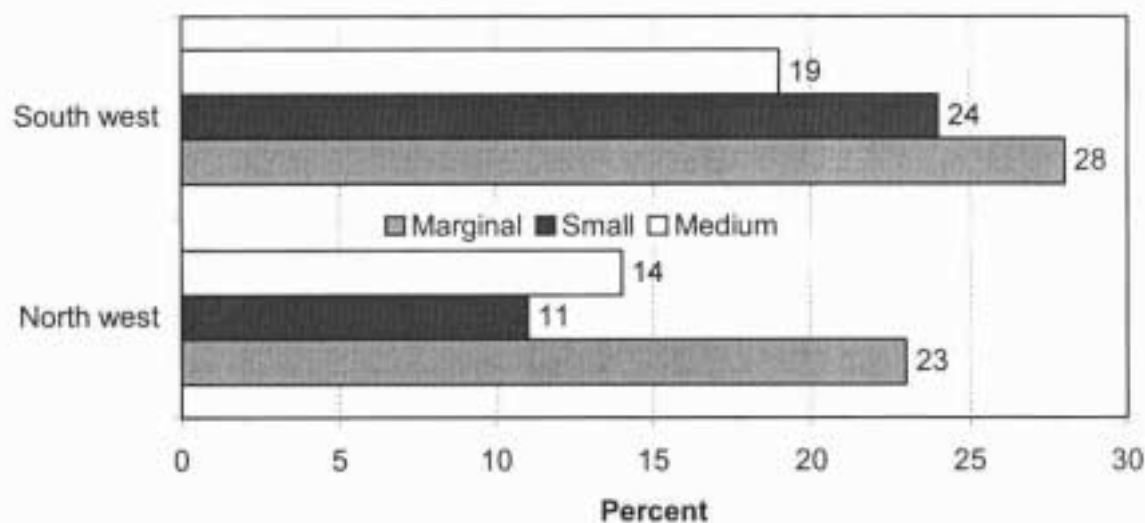


Figure 3: Percentage of seed purchased by farmers which is found to be wrong or mixed variety.



#### Mis-sold varieties of purchased seed

Another important factor in purchasing seed is the variety. Either by accident or intentionally, varieties are mixed, or in some instances, the variety purchased is a different variety than the seller claimed. Our findings revealed that 28% of seed purchased by marginal farmers in the SW, and 23% of marginal farmers in the NW was not the described variety or mixed. This underlines the difficulty facing farmers in purchasing seed. Farmers judge the quality and variety of seed mainly through visual appearance, but it is very difficult to tell certain varieties apart.

### Farmers' constraints and suggestions

The lack of BADC seed at a reasonable price is the most mentioned constraint for farmers (see table 12). Shortage of funds to purchase seed also a big constraint, with many farmers keen for more credit to be made available to them.

Table 12: Constraints to access of quality seed by the resource-poor farm households in the study areas, Bangladesh, 2001

Problems	South west			North west		
	percent of farmers					
	Marginal	Small	Medium	Marginal	Small	Medium
Lack of money	25.0	50.0	39.6	--	22.2	15.4
Adulteration / mixing	15.0	4.7	11.3	--	--	10.8
Non-availability of high quality seed (including BADC)	60.0	22.7	34.7	81.4	77.8	45.2
No certainty of germination	--	--	1.9	--	--	--
High price	--	22.6	12.5	18.6	--	17.8

## Section Three: Input marketing systems and behaviour

### *Why look at marketing systems?*

After the above section describing the findings from the farmer level work, our attention now switches to the input markets themselves. We need to consider markets because they are responsible for making good quality goods available to farmers. If markets are not working well: inputs may not be available when farmers require them; inputs will be over priced (hence reducing access); and products will be mis-sold (poor quality / wrong variety). Markets are therefore largely responsible for making inputs available to farmers. Although, as discussed in Section 1, availability doesn't ensure access, it is a fundamental requirement.

In analyzing the input markets, several key questions were asked.

- Are inputs physically available to farmers (relatively close to their farms)?
- Are markets performing efficiently (i.e. competitive conditions)?
- Are the markets delivering good quality inputs?

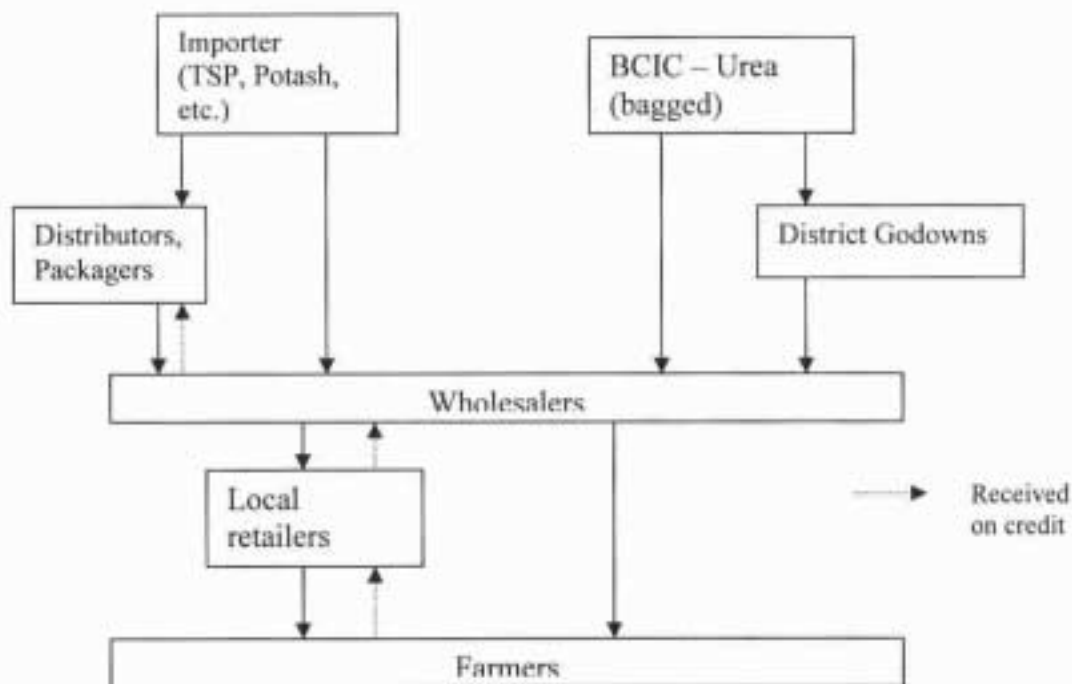
These questions were researched by holding a series of discussions and interviews with a number of market participants and key informants. The findings here are presented sector by sector, firstly fertilizer.

### *Fertilizer*

### Input availability

By far the most commonly used fertilizer is urea (80%), followed by TSP (15%). There currently appear to be no problems with availability with either. In other words, the markets are performing their function in distributing inputs to rural markets. **Urea** is manufactured by state-owned BCIC and distributed district by district on a quota basis. The Government also imports urea when there are potential problems with local shortages. The last major shortfall was in 1994/95, though since that time there have been no reports of shortages. **TSP** imported privately from a number of countries (including the USA and North Africa) and enters Bangladesh through Noapara (Jessore) and Chittagong ports. From these ports it is distributed (often on credit) to local retailers. Figure 4 shows the basic structure of the market.

Figure 4: Fertilizer marketing chains



### Barriers to entry into the fertilizer market.

As discussed in section 1 above, barriers to entry are an important consideration in assessing market efficiency. Excessive barriers to entry, whether formal (for instance over-restrictive licensing requirements) or informal (such as forcibly excluding or harassing traders to gain market power), can lead to monopoly or oligopoly conditions, excessive marketing margins and high prices for consumers.

In the input markets of Bangladesh, wholesalers require a license to purchase and sell urea from BCIC distribution points. It is in the urea market that restrictions to trade are the most significant as a result of the urea crisis of 94/95. However, even in the urea

market, in the survey areas there were plenty of participants at different levels of the marketing systems. With many participants there are no monopolies and fixing prices by collusion is unlikely and we saw no evidence of this. Of course, it should be reiterated that despite there being many participants, farmers may be restricted as to who they can purchase from because of the need to purchase on credit - they often have to accept the terms offered to them.

#### Quality

Urea comes straight from BCIC factories and it can be assumed that it leaves the factory as good quality. It is bagged by BCIC and remains bagged until it reaches the retailer. The retailer may sell urea loose – which offers opportunity for adulteration. This is an important point – the form of the fertilizer, whether bagged or loose, is key to the ease and effort of adulteration. Obviously, when loose it is relatively easy to mix foreign matter with the fertilizer. When bagged, the person considering adulteration needs to be able to open the close the bag without detection. This is both time consuming and also easier to detect.

Unlike urea, imported fertilizer is more open to quality problems. Sub-standard produce can be imported and there are informal reports of such fertilizers escaping the customs authorities and entering the country, and also accusations of corruption at ports. In addition, as imports are normally in bulk and fertilizers are bagged in Noapara there is an opportunity for unscrupulous traders to adulterate, under-weigh, and mis-label the loose fertilizer that they import.

#### Fertilizer regulation

Fertilizer trade is regulated under the Fertilizer (Control) Order, 1995 under the Essential Commodities Act, 1956. The main implementing organization is the Department of Agricultural Extension (DAE). DAE thana level officers have a right to inspect fertilizer (and pesticides) at all levels of marketing system. In addition, there is quality control at customs which identifies those fertilizers which are banned (such as SSP), and also is meant to screen for sub-standard fertilizers entering the country. The suspect samples collected by DAE officers are currently sent to the Soil Resources Development Institute (SRDI) for laboratory analysis to check against government standards. BADC will take over this role once new laboratories are established, though this could take several years.

The reason why SRDI is currently performing this role is due to general shortages of appropriate laboratory facilities throughout the country. Although this is currently being addressed through a Danish funded project, it remains a serious constraint to the enforcement of regulation. No precise data is available on the amount of fertilizer which is found to be sub-standard though this checking process, though informally it is very low for urea and TSP, and slightly higher for zinc. Whether these perceptions of officers involved in fertilizer monitoring and analysis reflect the true extent of adulteration is impossible to say. However, from our farmer survey, and also from the allegations of those in the fertilizer business, it would appear that adulteration is more serious than is currently picked up by the regulatory system. Indeed, there are many informal reports of corruption with respect to poor quality fertilizer – with officers at ports and within

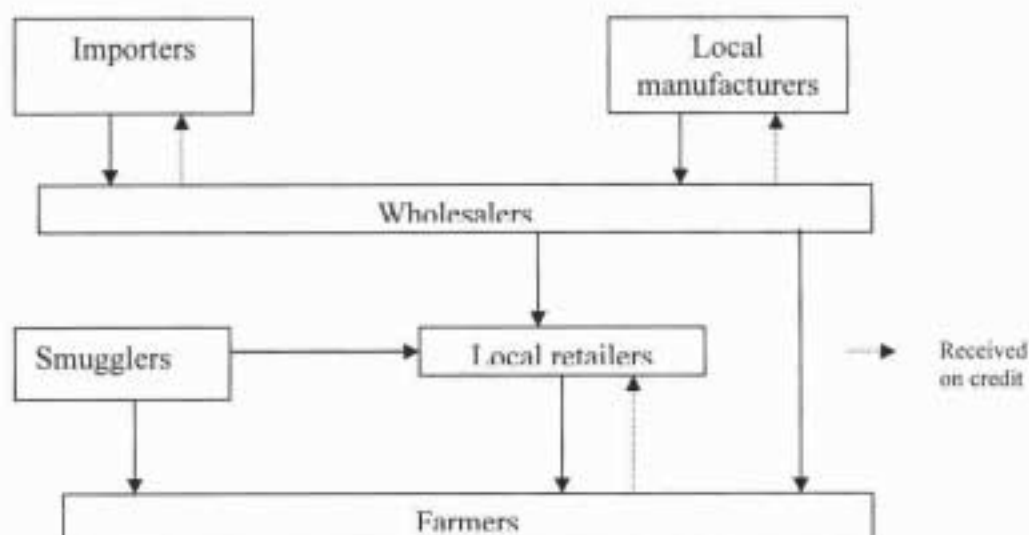
districts 'turning a blind eye' to sub-standard fertilizers in return for bribes. This accusation could not be substantiated during the research.

### *Pesticides*

#### Market structure.

The market structure for pesticides is slightly different than fertilizer. The main difference is that pesticides are branded goods, sold in labeled bottles, normally sealed and date stamped, whereas fertilizer branding is weak. The marketing system is operated by the pesticide companies, which have large networks of agents who supply to wholesalers or direct to retailers. Pesticides tend to be advanced on credit and sold at a fixed commission. Advancing inputs on credit ensures wide availability, though international brands may not be available in local markets due to the lack of demand (because of their cost). In addition to these formal channels, pesticides are smuggled from India - these are often sub-standard or banned. Illicit pesticides are normally sold directly to farmers or to local retailers

*Figure 5: Pesticide marketing chains*



#### Barriers to entry

There are some concerns about companies having excessive market power in pesticide markets. In return for receiving pesticides on credit, wholesalers and retailers are contracted to be agents of one particular company, and not allowed to sell any other company's produce. However there are a number of competing companies and the evidence we saw suggests that within any market there is a choice of companies competing on price.

#### Quality

International brands (eg Novartis, Syngenta) are considered by everyone we spoke with to be the best quality. However, these brands, although desirable, are expensive and it tends to be only larger farmers who can afford to purchase them. The more common brands are cheaper local and Indian brands, which are of lower quality but more accessible. Finally, smuggled goods are of highly variable quality but are far cheaper than those products available in the formal market. As a general rule, traders make higher margins on cheaper produce (international brands have fixed commission) and there is therefore an incentive to stock low quality.

#### Regulation and monitoring

The trade in pesticides is regulated by the Pesticides Regulation Act, 1985. The key organization in its implementation is the Plant Protection Department (PPD) which falls under the Department for Agricultural Extension in the Ministry of Agriculture. The PPD responds to the pesticide register of the World Health Organisation, which classifies and registers new pesticides. In theory therefore, the PPD only allows the importation and use of those pesticides which are internationally registered.

As with fertilizers, local DAE officers are on the front line of ensuring pesticide quality. They are responsible for identifying poor quality pesticide and they send suspect pesticides to the PPD in Dhaka for testing. The laboratories at the PPD are currently being upgraded under a DANIDA project to improve the capacity for testing samples.

### *Seed*

#### Market structure

There are both formal and informal seed markets, with the informal market being the most important for all categories of farmers. 'Informal' is used to describe those markets where seed grown by farmers is sold, as opposed to the 'formal' market where commercially multiplied seed, and seed from NGOs and BADC is sold.

The formal market has a similar marketing chain as for fertilizers, with seed produced by organizations (eg BADC, BRAC) being sold to licensed wholesalers either for direct retailing to farmers, or sold through village retailers. In addition, there is also a very limited trade in hybrid seed, most of which is currently imported.

The informal market links farmers with farmers, either directly through sales within a community, or through local markets. Larger farmers, or sometimes smaller farmers trying to earn extra cash, will sell their seed through local markets, typically through local retailers.

#### Market efficiency

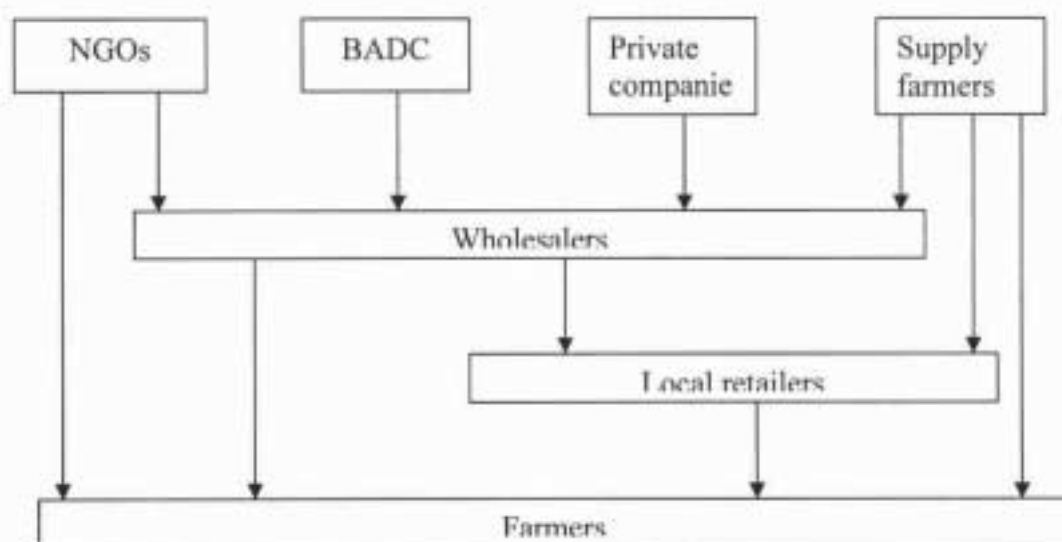
As with the urea market, the supply of many varieties of rice seed is in the hands of a parastatal, in this case BADC. However, unlike urea, which other than in the crisis of 94/95, successfully meets the demands of farmers, BADC regularly fails to meet the demands of farmers. This is partly to the credit of BADC – farmers regard the quality of



the seed to be the best available, therefore the high demand, however BADC currently cannot meet this demand for certain varieties. It is interesting that the demand for BADC seed varies enormously between varieties – in Khulna for instance we found BADC licensed distributors selling BR11 and BR23. BR23 was in high demand by farmers whilst the BR11 was not wanted, though BADC distributed similar quantities of each varieties irrespective of this demand pattern. The result of this was that the distributors were forced to sell BR11 below the fixed retail price in order to dispose of it, whilst BR23 was sold at nearly double the ‘fixed’ price.

There is therefore a problem with the market not being able to deliver the desired seed to farmers, though it should be stressed that this is not a problem with the marketing structure itself, but in seed production sector. Seed is generally available to farmers, though it tends to be the lower quality farmers’ seed.

Figure 6: Seed marketing chain



#### Quality

Quality is a major issue in the seed sector. Home-grown and informal markets dominate, though as we saw above, the quality from these sources is mixed, and often poor. As with fertilizer and pesticides, it is difficult for farmers to distinguish between different qualities – in this case this normally refers to the varieties of seed and the likely germination rate of the seed. Farmers have to rely either on their own experience, or trust the seller.

BADC has very good reputation for quality, though as described in the previous subsection, availability is not ensured. NGO seed has a mixed reputation – for example BRAC seed has lost some credibility in the south west survey area after BRAC was

selling what it claimed to be hybrid seed, though turned out to be BR28 (note that hybrid seed sells for as much as Taka 200 per kg, whilst BR28 is available from Taka 15 per kg!)

#### Regulation

The informal seed market is unregulated (by definition) – farmers sell whatever they grow. The formal seed market is regulated by the National Seed Board (NSB) under a number of seed related acts and rules. The NSB allows import of hybrids and private seed multiplication under license. The regulation requires that all seed are labeled truthfully. New seed varieties are certified by the Seed Certification Agency. There does not appear to be any procedure for testing seed and monitoring the quality of seed once it has been released into the market.

## Section Four: Summary of key findings

The previous two sections described the findings of our research. In this section, we extract the key findings from the different research activities under the following headings:

- input use
- input availability
- input accessibility
- input quality
- input regulation

#### Input use

- There is a high level of fertilizer and pesticide use, even in the smallest farms, showing the importance of using agri-chemicals by farmers, and also showing that despite fears of low quality, farmers are still continuing to use high levels of inputs.
- There is a general lack of knowledge of fertilizer and pesticide use for both farmers and traders.

#### Input availability

- The markets for fertilizer and pesticide appear to function well, with the types and quantities that farmers use available locally.
- In the seed market, BADC is most desired, but is not readily available.

#### Input accessibility

- The markets we explored in our study areas appear to be competitive, with no evidence of monopolies or excessive prices in open market.
- However, smaller farmers are often forced to take inputs (especially fertilizer and pesticides) on credit, limiting their options and increasing opportunity for exploitation
- Obviously, financial capital (i.e. levels of cash) is important in gaining access to desired inputs, however, social capital is also very important for those farmers who are unable to pay cash on the spot, as they depend on credit which will only be given to them by input suppliers who trust them.

#### Input quality

- It is very difficult for farmers to assess quality of inputs (fertilizer, pesticides and seed) by the means available to them (basically, visually). Laboratory testing is the only sure way of determining quality (other than by using the input, by which time, of course, it is too late for the farmer if it is poor quality).
- The majority of farmers believe that fertilizers and pesticides are adulterated. More farmers believe fertilizers and pesticides are adulterated than have actually experienced it. Although perceptions of poor quality exceed experiences, perceptions are important as they affect farmers' production behaviour and may lead to a mis-allocation of inputs.
- The poor use of inputs (due to the lack of information on proper use) probably leads to an over-estimation of the problem of poor quality inputs. Only a comprehensive survey and laboratory testing of inputs could reveal the true extent of poor quality inputs.
- The difficult for farmers to assess quality means that they depend on trust for quality.
- Trust works two ways - it is in the interest of traders to sell good quality so that they develop a good reputation and farmers trust them, and hence they increase business.
- There are opportunities in particular in the fertilizer market for adulteration at different levels of marketing system – this is because the fertilizer is often loose and therefore mixing is relatively easy.
- Adulteration in the pesticide market is less easy for wholesalers and retailers as it comes in sealed bottles. However, there are widespread allegations of adulteration – possibly this occurs at the manufacturing level.
- Inferior quality pesticides smuggled from India, especially in border areas. Smuggled produce escapes import duties and is therefore sold cheaply in Bangladesh. The import duties encourage smuggling.
- international brands of pesticides are recognised as best quality – however, developing a brand is expensive and increases prices to beyond many farmers' means.
- BADC is recognised as the best seed, though is not always available or accessible as prices of demanded seeds escalate to beyond farmers' means

#### Input regulation

- Generally, suitable regulation is in place in all the input sectors considered.
- however, enforcement of regulation is fairly weak, due to resourcing constraints
- there are accusations of corruption in importation of sub-standard inputs and adulteration

The most important problems for resource poor farmers in accessing good quality inputs are as follows:

1. Lack of information on appropriate inputs (and their use)
2. Limited access due to financial constraints
3. Vulnerable to unscrupulous traders who knowingly sell sub-standard quality inputs
4. Lack of availability of good quality seed
5. The lack of protection from regulations, which are not always enforced

## Section Five: Where to go from here?

Given the problems and issues summarized in the previous section, what approaches are most suitable for addressing the problems and improving the access of resource poor farmers to good quality inputs? In considering approaches to follow on from the conclusions from this research, three broad approaches are available: projects, policies and research. 'Projects' is used to describe smaller scale 'micro' interventions normally targeted at specific disadvantaged groups, and often implemented by NGOs or government departments. Policies are government implemented and involve changes to the policy environment in which markets operate. The third area, research, may be required in areas where further information is necessary. In this section, we describe some options for interventions to address the problems identified above.

### *Projects*

#### *Agent scheme - Zimbabwe*

CARE Zimbabwe has a programme aimed at increasing the availability of inputs at the local level. It is a credit programme targeted at local input suppliers (agents), typically small-scale village level retailers. These agents are identified, initially by nomination from the communities themselves, and candidates are reviewed by local government agencies (e.g. extension services). Training is provided to selected agents in input handling, marketing, finance and book-keeping. The trained agents then make input orders to CARE which negotiates prices and terms with regional suppliers. Agents are allowed an inventory of up to US\$1000. CARE consolidates the orders and arranges bulk purchases and delivery of the inputs. CARE bears the risk for 30-60 day credits provided to the agents, who repay CARE as they sell the inputs to farmers. Continual monitoring of stocks is carried out. The hope is that after two years of good performance, agents will be able to graduate and deal directly with the suppliers.

Current performance of the programme is very encouraging. In its first year (1996/97) about US\$150,000 worth of inputs were sold to farmers. 95 percent of payments have been made on time. Although CARE were unable to provide estimates of the number of small-holders who have benefited from the programme, it is likely that it is significant. Several benefits accrue to small-holders: inputs are now cheaper to purchase, partly due to lower transportation costs and partly due to the bulk purchases made by CARE; and agents advise on the appropriate choice and use of inputs. Agents benefit from increasing their reputation and potentially increasing their reputation.

Such an approach could be adapted for Bangladesh, especially in the pesticide market, but also potentially for fertilizer. As we saw in the pesticide market, farmers recognize that the best quality pesticides are those brands produced by large international companies. However, these are too expensive for smallholders. A scheme such as the Agent scheme in Zimbabwe does lower costs of pesticides to farmers, though more work would need to be conducted to determine whether this would make them affordable to farmers if the scheme operated in Bangladesh. However, even in the fertilizer sector,

there could be some benefit from by-passing some levels of the marketing chain where currently there may be adulteration.

#### Projects: Loans for crop production - Uganda

Rural areas are generally poorly served by the commercial banking sector in Bangladesh, as they are in most developing economies, with only the state owned banks and some NGOs providing services to farmers. However, even these sources tend to shy away from agricultural crop lending, and therefore farmers often have no institutional credit sources for purchasing inputs. This is due to past bad experiences with schemes aimed at rural finance, and more general difficulties due to the perceived risks of agricultural production and risks of default. However, in some countries there are some new approaches to agricultural lending which may provide some lessons for Bangladesh. The example given here is the Centenary Rural Development Bank in Uganda, which has recently launched a programme to target smallholders.

The Centenary Rural Development Bank launched a pilot scheme in August 1998 targeting financial services specifically at smallholders. The underpinning philosophy of the bank is that the emphasis should be on the ability of the borrower to repay a loan, rather than security of the loan. An emphasis on security has led to innovations like group lending where peer pressure substitutes for collateral. The purpose of other 'innovations' such as regular and frequent repayment instalments is again basically to secure the loan (i.e. to make sure that it is repaid).

The Centenary approach places the emphasis on the ability to repay. Loans are made against a projected cash flow. Household budget analysis is key: after the initial approach by the applicant, a Bank Field Officer visits the household to carry out an analysis of household income and expenditure, based on income (on farm and off farm), and all household expenditures. From this, an estimate of household cash flow, with and without a loan, can be made. Loans are made when it is clear that the loan can be repaid. Repayment terms are then tailored to fit the cash flow analysis. The field officers are qualified agronomists who have received rural finance training. As such, they are able to recognise the agricultural potential of a farm, and judge the profitability of the activities which will contribute to loan repayment.

Although security is not the basis on which the loan is made, a variety of tools are used to at least partially secure the loan: guarantors; land titles (including those for customary tenure); post-dated cheques (it is a criminal offence to have a cheque bounced in Uganda); seizure of assets; and using standing crops as collateral.

The early signs are positive, and it is possible that NGOs and bank lending in Bangladesh could benefit from such experiences. The Centenary Rural Development Bank is not the only innovator in the field of agricultural finance – other positive experiences also provide hope for developing such services in Bangladesh<sup>6</sup>. The point to make here is not to suggest which approach would be most suitable for rural Bangladesh, but to realize that options do exist.

---

<sup>6</sup> For examples see Goodland, A et al (1999)

### Projects: Seed systems - Nepal<sup>7</sup>

Problems of poor access to good quality seed are common across many developing countries. A common approach to combating this is to encourage small scale seed multiplication projects. On the whole these have not been very successful. However, a major exception is the Seed Sector Support Project (SSSP) in Nepal, which has successfully promoted commercial seed production by small farmers. This is a scheme aimed at increasing the supply of vegetable seed, but could provide lessons for the Bangladesh rice seed sector. The project provides assistance to groups of farmers. Crucially, it organizes 'workshops' in which the farmer groups are brought together with seed merchants. During these workshops the farmers and merchants negotiate contracts to supply seed. The merchants have a good idea of what the market demands in terms of varieties, quantities and quality, and contracts are arranged, including prices, for farmers to meet the merchants' requirements. The project sources government seed for multiplication and sells this to farmers. The project has increased the quality of seed available in the market.

### Projects: Farmer group purchase of inputs<sup>8</sup>

Farmer cooperation has in recent years become an increasingly popular solution to marketing constraints such as access to inputs. The theory is that by working together farmers can realise the scale economies of bulk acquisition and enter into more stable relationships with suppliers or traders. There is growing evidence, however, that projects promoting farmer cooperation do not always lead to the emergence of viable farmer groups. Project evaluations indicate that groups are often formed hastily and with little reference to underlying patterns of social and economic organisation or commitment to cooperative action. As a result many do not survive long and in the worst situation, members negative experiences contribute to undermining future self-help initiatives (as has happened in Bangladesh). In the light of this, policy-makers need to reassess the role that groups can play based on a more realistic understanding of what contributes to successful farmer cooperation.

Lessons from experience suggest that donors, NGOs, banks and other development organizations wishing to promote farmer cooperation should refrain from rushing the process of group formation or from overburdening groups with too many or too complex functions. They should avoid providing subsidised credit or grants, but instead encourage farmers to develop their own forms of group organisation, based on an analysis of their own situation and the resources at their disposal.

Our experience in this research has found that farmers in Bangladesh are highly skeptical of group activities because of negative experiences in the past, and few thought that such an approach would be successful in increasing access to good quality inputs. This suggests that this approach should only be pursued with great caution in Bangladesh, and learn from the experiences of similar schemes.

---

<sup>7</sup> See Tripp, R (2001)

<sup>8</sup> Stringfellow et al (1997)

### *Policies:*

#### Improved monitoring of quality

The main direct role for policy in improving access to good quality inputs is to improve capacity of monitoring and enforcement agencies. Regulation of the market is the key role for the public sector, and currently it appears that the existing regulation is not being enforced. Ideally, testing of inputs should become more systematic, with routine random testing of all inputs, in particular fertilizers and pesticides at the point at which they are sold to farmers and throughout their respective marketing chains. However, this would place heavy demands on public resources, and may not be realistic.

Given the expense of comprehensive monitoring programmes, ways of reducing the cost by transferring responsibilities to local communities could be explored (see Tripp and Gisselquist, 1996). For example, there may be scope for involving community organizations and farmer groups, which could be trained in simple methods to monitor the quality of inputs available to them. Farmers themselves are far better placed to identify potential poor quality inputs suppliers (from poor input performance) and could alert local DAE officials to investigate further.

#### Improved public provision of information

In addition, as discussed earlier, there is a need for greater information to be provided to farmers on the identification of poor quality inputs, but more importantly on the correct use of inputs, especially pesticides and also fertilizers. The better use of inputs may reduce farmers' perceptions of poor quality. Such information can also be directly at retailers who are in indirect contact with farmers, and from whom farmers depend upon for input information.

### *Research:*

This research explored the factors which could lead to farmers' perceptions and experiences of poor quality inputs. However, what the research could not do was to assess the actual extent of poor quality inputs nor the impact of poor quality inputs on productivity. Without this information it is impossible to say with any certainty what the scale of the problem is. All we can say is that farmers do perceive a problem, which is itself important, and also that there are clearly opportunities for adulteration. However, the perceived poor performance of inputs may be attributable to the poor use of inputs, or the incorrect selection of inputs, or over-expectation of farmers with respect to the performance of inputs.

Clearly, a thorough survey on input quality is a large task, involving a large amount of sample collection and laboratory analysis. However, there is sufficient evidence in our research to suggest that a problem exists, and the scale of the response to the problem requires a better idea of the scale of the problem.

One further area for possible further research is in the costs of inputs. As we have seen, access to good quality is closely related to price. Although the markets in Bangladesh

appear to function well, a price comparison with other countries with open markets would be an interesting study. In particular, for urea production which is currently conducted by a parastatal. This is the single most important input for rice farmers, and has a major bearing on the profitability of rice production. How do farmers' input expenses compare with other countries and is there scope to reduce costs in the production of major inputs?



## References:

- Ahmed, R. (2000) Liberalization of Agricultural Input Markets in Bangladesh, in Ahmed, R., Haggblade, S. and Chowdhury, T. (eds) *Out of the Shadow of Famine*. John Hopkins University Press, Baltimore.
- Ahmed, R. (1998) Assessment of Past Agricultural Policies, in R Faruque (ed.) *Bangladesh Agriculture in the 21<sup>st</sup> century*. The University Press Limited, Dhaka
- Carney, D., ed. (1998) *Sustainable Rural Livelihoods - What contributions can we make?* Papers presented at the Department for International Development's Natural Resources Advisors' Conference, July 1998. London: DFID
- Crow, B. and Murshid, K.A.S. (1994) Economic returns to social power: merchants' finance and interlinkage in the grain markets of Bangladesh. *World Development* Vol. 22, No. 7, pp. 1011-1030.
- Farrington, J. and Carney D. (1996), Formal farmer organisations in the agricultural technology system: current roles and future challenges. ODI Natural Resource Perspectives no. 14, ODI, London
- Goodland, A and Gordon, A (eds) (1999) Use of purchased inputs by smallholder farmers in Uganda and Zimbabwe. Workshop Proceedings from Uganda (4-5 February 1999) and Zimbabwe (1-2 March 1999). Natural Resources Institute, Chatham UK.
- Goodland, A., Onumah, G. and Amadi, J. with Griffith, G. (1999) *Rural Finance Policy* Series 1. Chatham UK: Natural Resources Institute
- Griffith, G., Kindness, H., Goodland, A. and Gordon, A. (1999) *Institutional Development and Poverty Reduction*. Policy Series 2. Chatham UK: Natural Resources Institute
- PETRRRA Project (2000) Stakeholder analysis for South West Coastal Region of Bangladesh. PETRRRA, Dhaka
- Shahabuddin, Q. and Rahman, R.I. (1998) Agricultural growth and stagnation in Bangladesh. Centre on Integrated Rural Development for Asia and the Pacific; Dhaka
- Shahabuddin, Q. and Zohir, S. (1994) Analysis of markets as conduits of macro-micro transmission in Bangladesh. Centre on Integrated Rural Development for Asia and the Pacific, Dhaka
- Stringfellow, R., Jonathan Coulter, Trevor Lucey, Colin Mckone and Ambereene Hussain *Improving the Access of Smallholders to Agricultural Services in Sub-Saharan Africa: Farmer Cooperation and the role of the Donor Community*. Natural Resource Perspectives No 20 June 1997

Tripp, R (2001) Seed provision and agricultural development. Overseas Development Institute, London.

Tripp, R. and Gisselquist, D. (1996) A fresh look at Agricultural Input Regulation. Natural Resources Perspectives, No 8, March 1996

USAID (1996) Privatizing Fertilizer Distribution: Bangladesh Case Study. USAID Evaluation Highlights No 54. Washington DC