POLICY SERIES

Policy Series 7

IMPROVING SMALLHOLDER ACCESS TO PURCHASED INPUTS IN SUB-SAHARAN AFRICA

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POLICY SERIES

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PREFACE

This series is principally concerned with current policy issues of importance to developing countries but also covers those relevant to countries in transition. The focus is upon policies which affect the management of natural resources in support of sustainable livelilhoods. Much of the series will be devoted to concerns affecting the livelihoods of poor people in rural areas, recognizing the linkages with non-natural resource-based livelihoods. It will also include the interests of the urban poor, where these are linked to the use of natural resources as part of livelihood strategies.

The series will take a holistic view and cover both the economic and social components affecting livelihoods, and associated factors notably with respect to health and education. The aim is to provide topical analyses which are based upon field research where appropriate, and which will inform development practitioners concerned with issues of poverty in development.

The series is timely, given the increasing focus upon poverty and poverty elimination in the agenda of the development community. It is also timely with respect to the growing body of recent work which seeks to replace earlier, simplistic structural adjustment programmes, with more flexible approaches to livelihoods, institutions and partnerships.

Policy analysis is often assumed to be the remit of social scientists alone. Whilst it is recognized that social science may play a pivotal role, interactions with other disciplines may also be critical in understanding and analysing policy issues of importance to the poor. The series therefore draws upon a wide range of social and natural scientific disciplines reflecting the resource base at the Natural Resources Institute.

EXECUTIVE SUMMARY

This paper is about policies and interventions to promote increased access to purchased inputs by smallholders in sub-Saharan Africa. It is one of a series of papers, targeted at a wide audience in the development community, intended to contribute to increased focus on poverty by informing and stimulating debate, policy and action amongst key players in the development process.

Increased use of inputs in African agriculture is an important policy issue because:

- most of Africa's population lives in rural areas and is dependent on agriculture for at least part of its income;
- in the past, increases in productivity were achieved through the expansion of planted area, but as population pressure increases there is less scope to do this; few African countries have been able to keep pace with the food needs of growing populations and food imports are rising steeply;
- much of Africa's agricultural production is located in vulnerable, low potential areas, and even higher potential lands are now showing signs of environmental degradation;
- reform of agricultural markets has left many farmers with poorer access to purchased inputs.

Five sets of issues affecting access to inputs are explored: affordability, availability, access to information, risk and uncertainty, and the overall commercial context. Case studies are used to illustrate how these issues can be addressed.

Credit is often assumed to hold the key to improved access. Different approaches to input credit are reviewed and best practice measures are outlined. Other ways to improve affordability are also identified: timing input sales to coincide with times when farmers have cash; selling inputs in small pack sizes suited to small producers (e.g. seed); and lowering prices, by making cost reductions in distribution and marketing (e.g. through bulk purchases, transport sharing arrangements, and farmers' groups taking on more responsibilities).

Many consider the physical availability of inputs to be a more important constraint to access with rural distribution networks in most African countries being thin and unreliable. Innovative approaches to the development of input stockist networks are reviewed, illustrating what can be achieved through constructive partnerships between the commercial, private non-profit, farming and government sectors.

Information constraints are also important – be they in terms of information gaps (basic research on fertilizer response, for instance) or information flows. Although farming is, to some extent, inherently risky, better information reduces uncertainty, enabling farmers to make more informed production decisions.

In addition to policies aimed towards the general development of rural economies, a number of more specific policy recommendations are made:

- avoid actions which undermine the development of sustainable commercial input supply networks;
- support input markets by setting standards and regulations, and providing information and training;
- promote synergistic partnerships between commercial, private non-profit, farming and government sectors;
- fill critical research and information gaps.

1

INTRODUCTION

This paper is about policies and interventions to promote increased access to purchased inputs by smallholders in sub-Saharan Africa. It is one of a series of papers which seeks to elaborate the relationship between poverty, rural livelihoods and key policy areas. The papers are targeted at a wide audience in developing country governments, donor agencies, research institutes and other organizations concerned with development or governance. They are intended to contribute to increased focus on poverty by informing and stimulating debate, policy and action amongst key players in the development process.

IMPROVING ACCESS TO PURCHASED AGRICULTURAL INPUTS: WHY IT IS IMPORTANT

Smallholder agriculture in much of sub-Saharan Africa is essentially low-input low-output. Since 1970, cereal yields in Africa have stagnated, whilst they have trebled in Asia, and risen by 2.5 times in Latin America. Green revolution technology has not been widely adopted. For example, for all developing countries, the shares of cropped area devoted to modern varieties are 57% (maize), 70% (wheat) and 74% (rice). Of these three, maize is the crop most relevant to Africa but only 43% of maize area in sub-Saharan Africa is devoted to modern varieties of maize (Fritschel *et al*., 1996). Moreover, crops that are important in African food systems are less important in other regions, and have been the subject of less research (for example, sorghum and millet, roots and tubers, and cooking bananas). Fertilizer use is also extremely low at 9–11 kg/ha (Badiane and Delgado, 1995); rain-fed agriculture in India has three times the amount of fertilizer applied to African crops (African Development Bank, 1996). Such aggregate data, moreover, conceal extreme variability in application: five

countries account for roughly 66% of fertilizer consumption in sub-Saharan Africa (African Development Bank, 1996).

Increased use of inputs in African agriculture is an important policy issue because:

- most of Africa's population lives in rural areas and is dependent on agriculture for at least part of its income;
- in the past, increases in productivity were achieved through expansion of planted area, but as population pressure increases there is markedly less scope for further expansion;
- few African countries have been able to keep pace with the food needs of growing populations and food imports are rising steeply;
- much of Africa's agricultural production is located in vulnerable, low potential areas, and even higher potential lands are now showing signs of environmental degradation;
- changes in agricultural markets following structural adjustment have left many farmers with poorer access to purchased inputs.

THE PIVOTAL ROLE OF AGRICULTURE

Sub-Saharan Africa, more than any other region in the world, is overwhelmingly dependent on the agricultural sector. Agriculture accounts for a large proportion of GDP and exports in most countries (other than those with significant mineral deposits) and is central to the livelihoods of the poor who are predominantly rural. It provides both direct employment and secondary employment in handling and processing industries. Growth in agriculture also tends to stimulate growth and livelihood opportunities in other sectors, especially through increased demand for goods and services. Agricultural development is also closely linked with environmental issues of soil fertility, deforestation and water use. Anyone concerned with poverty in Africa is necessarily concerned with agriculture because of its role in the incomes and consumption of the poor.

Historically, increases in agricultural output in Africa were largely attributable to the expansion of cultivated area, through the destruction of forest and cultivation of increasingly marginal areas. However, the scope to convert new lands has declined. For instance, the rate at which new arable land was developed in Africa (including North Africa) was about 30% less in the 1970s than it had been in the 1960s, and in some regions

the decline was much starker. In southern Africa, for example, arable land development fell from about 2% per annum to around 0.5%. Reserves of good quality land were running out, and farmers had little incentive to expand given poor producer prices, labour shortages and the decline in rainfall since the mid-1950s. It is now widely accepted that further production increases can only come (with a few exceptions) from more intensive production (see, for example, Badiane and Delgado, 1995; Marter and Gordon, 1996; Lipton, 1988).

Analyses of trends in population growth, food production and incomes consistently emphasize growing food deficits in Africa, under most reasonable assumptions (see, for example, Agcaoili and Rosegrant, 1994; Fritschel *et al.*, 1996).

Population growth rates in Africa overtook Latin America and the Caribbean in the 1970s. In many African countries the 1990 population was more than three times that of 1950. The raw data indicate that in sub-Saharan Africa, the countries with the highest population growth were Kenya, Uganda, Zimbabwe and Côte d'Ivoire where 1990 populations were at least 3.6 times those in 1950 (United Nations, 1995). (Caution is needed, however, in interpreting much of the population data for Africa. For many countries, current figures are estimates or projections based on census data from the early 1980s.) Moreover, Africa is *urbanizing* at a rapid rate; approximately 30% of the population is now urban. Table 1 illustrates considerable inter-country variability in urbanization but also shows an unmistakable upward trend. (Total populations are included to add perspective.)

Table 1 Urban population shares in selected African countries 1950–90

	Urban share 1950 (%)	**Urban share 1990 (%)**	**Total population 1990**
Nigeria	10	35	96 million
Ethiopia	5	12	47 million
Democratic Republic of Congo	19	28	37 million
Kenya	6	24	24 million
South Africa	43	49	37 million
Tanzania	4	21	26 million

One of the implications of these trends is that if African countries are to sustain or improve current levels of food self-sufficiency, agricultural labour productivity must continue to increase. This has happened, but not as fast as population growth, and not enough to feed the growing share of non-food producing consumers. For the population as a whole, per capita cereal production has actually fallen by about 15% in Africa (1992–94 production compared with 1970–72, Fritschel *et al.*, 1996). The data on other staples (notably roots and tubers) are notoriously unreliable but it is implausible that growth in their output has been significantly faster. Banana yields have been falling in Uganda (where it is most important as a staple). New cassava varieties have been introduced but the crop has also been affected by some major pests and diseases, such as cassava mosaic disease.

Much of Africa's agricultural production and rural poor are located in low potential areas (80% of cultivated area is low potential, according to Delgado (1997)). This label conceals considerable differences in the nature of low potential land but it does underline the challenges implicit in increasing agricultural productivity in Africa. The term encompasses consideration of economic, physical and technological factors, reflecting, for instance, market access, the inherent productivity of the natural resource base, and use of appropriate environment-saving technologies. Land potential can change over time. Both high potential and low potential lands may deteriorate through unsustainable practices, whilst infrastructure development, changes in production technology, and policy changes which favour domestic crops over imports, may improve potential. The key issues of concern here are:

- production on low potential lands can only be sustained or increased with increased use of inputs;
- whilst some of those inputs may come from within the farming system, there is an important place for some purchased inputs (particularly improved varieties and inorganic fertilizer);
- economic factors which contribute to low potential (poor market access and low purchasing power of farmers) also limit smallholder ability to purchase the required inputs, whilst low and uncertain rainfall increases the risk associated with higher input systems.

THE POLICY CONTEXT: IMPACTS OF STRUCTURAL ADJUSTMENT

Although somewhat mixed and patchy, there is growing evidence that structural adjustment has reduced smallholder use of purchased inputs. This can be attributed to various aspects of economic reform:

- depreciation has led to increases in the domestic value of externally traded goods, and a relative decline in the value of non-tradeables; as a consequence the use of imported fertilizer on food crops is now less economic or even uneconomic;
- governments have closed loss-making credit programmes and subsidized input schemes;
- remote areas, once served by the parastatals, have tended to be neglected by private marketing agents, who have now taken over crop and agricultural input trade;
- crop prices are less predictable such that risk-averse farmers are less likely to use purchased inputs;
- removal of pan-territorial pricing has often had a strong impact in more remote regions, both in terms of higher input and lower output prices;
- the abolition of crop purchase monopolies has made it difficult to establish viable farmer credit schemes, which in the past relied on repayment being made when the harvest was sold;
- public sector spending restraint has reduced the resources available to extension services.

INTENSIFICATION: PURCHASED INPUTS AND FARMER-SUPPLIED INPUTS

The focus of this paper is *purchased* inputs. This focus is not intended to imply any exclusivity in this strategy to increase productivity rather that purchased inputs, even in small quantities, can usefully complement other means of intensification. At the most basic level, this means improved varieties and possibly fertilizer. Many of the issues affecting access to purchased inputs are somewhat different to those that apply to farmer-supplied inputs, and certainly demand separate consideration. In addition, the economic context in Africa in which farmers take and act upon production decisions has been subject to considerable recent change making re-analysis of these issues an urgent priority.

The most fundamental input that may be purchased is seed and even where farmers rely overwhelmingly on their own or their neighbours' seed, occasional purchases of seed can usefully complement this strategy. The third section of the paper discusses how informal seed systems can be strengthened (not replaced) by access to improved varieties. Although Africa currently plants a smaller share of crop area with high yielding varieties (HYVs) than other regions, many authors argue that most of sub-Saharan Africa has no alternative to HYVs, given population increase and pressure. Moreover, the maize area is already significant (47% is planted with modern varieties), and sorghum also has potential (Lipton, 1988; Boughton and Reardon, 1997, citing Matlon, 1990).

As farmers intensify, fertilizer is the next most critical purchased input. Although modern cereal varieties may out-yield traditional varieties without inorganic fertilizer application, on most soils it is not possible to increase yields substantially without some chemical fertilizer. Lipton (1988, p. 1249) states that ''organic manure can complement this, but there is seldom enough, near to the crop, to substitute significantly for inorganics''. Larson and Frisvold (1996, p. 509) argue that ''substantial growth in inorganic fertilizer use is a prerequisite for sustained agricultural growth in sub-Saharan Africa''.

Many African farmers are scarcely able to afford purchased inputs of any nature. Certainly, where used they must be used to best effect, which means in combination with adequate water, timely crop husbandry, and complementary farmer-supplied inputs, including organic fertilizer.

In addition to the extensive literature on this topic and related issues, the paper draws heavily on fieldwork and workshops conducted by NRI in Uganda and Zimbabwe in 1998 and 1999. The purpose of this research was to identify viable private credit schemes that facilitate smallholder access to production inputs. Whilst the work confirmed the importance of credit, it pointed to a number of other constraints presently affecting the use of purchased inputs.

2

ISSUES AFFECTING SMALLHOLDER USE OF PURCHASED INPUTS

Five sets of issues are explored:

- affordability
- availability
- information
- uncertainty
- commercial context.

There is no prioritization implicit in the order of the topics, they are all important and linked by many interrelated issues.

Whilst some of these topics may seem obvious, most have several dimensions. In the following section, where strategies to increase the use of purchased inputs are explored, the importance of these different dimensions becomes clearer. Thus, for example, affordability can be improved by a change in the timing of sales.

AFFORDABILITY

Many African smallholders cannot afford to buy agricultural inputs. Although this is a straightforward enough concept, it does encompass different dimensions.

At its simplest, farmers cannot afford inputs because they are too expensive. Many agricultural inputs have been subject to dramatic price increases as a result of the removal of subsidies, price controls and currency depreciation. Gibbon (1992) reports that under structural

adjustment in Ghana, fertilizer and pesticide price rises exceeded inflation by a factor of five or six. In some cases, the price structure and yield response is such that the use of certain inputs may no longer be justified on crops produced for the domestic market. Whether or not this is the case, most African smallholders have limited purchasing power and agricultural inputs represent a major outlay.

Whilst there may be some profiteering by traders, there are many other factors which contribute to the inherently high costs of delivering inputs to farming areas, under the market and infrastructure conditions prevailing at the present time. These factors include:

- low volume imports – so less discount for bulk purchases and higher per unit transport costs (the latter is particularly true of land-locked countries);
- dispersed local markets making low volume purchases in a tightly concentrated seasonal window – which all contribute to high costs per unit of input;
- poor roads and telecommunications, and transport bottlenecks (including the operation of transport cartels) increase transaction costs;
- payment of bribes in order to obtain timely import clearance on seasonal inputs, similarly bribes may be needed at other points in the transport chain.

Closely related to price are the cash costs involved in input purchase other than the price of the input itself (there are other non-cash costs too, including the time needed to find out about inputs and to source them). The purchase of inputs may require the farmer to travel to a local (or distant) town, necessitating expenditure on transport and accommodation, it may also require phone calls (where these are possible), or even signing up for a larger package which includes unwanted inputs. Some farmers in Uganda apparently sign up for seed and fertilizer packages available through development projects, simply to obtain the seed, which is in short supply.

Some inputs would be more affordable if they were available in smaller pack sizes (notwithstanding the additional packaging costs). African farmers tend to plant small areas; they plant many crops and they inter-crop. When they try out new seed they often only want small quantities

initially and may still demand modest quantities of seed which is known to them. Obvious though this may be, inputs such as seed are often not available in sufficiently small pack sizes. Even purpose-built seed handling systems may not have appropriate pack size capacity. (For example, the Uganda Seed Project, a parastatal concerned with smallholder seed provision, has the capacity for 25 kg and 10 kg seed packs. In an attempt to respond to farmer needs, they fill 5 kg and 2 kg packs manually, but recognize that pack sizes of 1 kg and 500 g would be better still.) Whilst retail outlets, projects or farmers may split packs, this always calls into question seed quality guarantees.

Although credit may theoretically provide a solution to low purchasing power, Africa's smallholders are notoriously ill-served by formal credit mechanisms. Banks regard farmers as high risk and high cost (because of the small size of individual transactions) and tend to have poor rural networks. Former loss-making state-supported schemes have been closed, along with the schemes run by parastatals that had crop purchase monopolies. Although some NGOs and other organizations are trying to develop sustainable farmer lending methodologies, there are few good examples, and farmer participation in such schemes is the exception rather than the rule. Informal sources of credit are no doubt important – particularly from friends and family – but inadequate, since expenditure patterns follow a similar seasonal pattern in rural areas, with everyone's need arising at the same time.

Cash flow is important and the timing of expenditure may be a crucial determinant of affordability. In poor households there is intense demand for scarce cash resources, and a prior crisis may eat into resources otherwise ear-marked for important agricultural inputs. In Zimbabwe, the cotton companies sell next season's inputs when they purchase seed cotton, knowing that farmers have the resources to make purchases at that time. Similarly, in Uganda, farmers grow cotton despite its questionable profitability, and it seems that the timing of crop sales, which coincide with Christmas and new school year expenditures, is an important consideration.

The decision to purchase inputs for a particular crop may be influenced by access to cash within the household and traditional domains of decision-making. Whilst men are often involved in the production and marketing decisions concerning traditional cash crops, women tend to play a greater

role in the production and marketing of food crops. They may find that their husbands do not attach a priority on input needs for these crops, whilst their own resources may be too stretched to extend to input purchase.

AVAILABILITY

Even when households can afford inputs, they may be unavailable. Again, there are several aspects to this.

Despite large numbers of farmers, many African countries represent very small markets for agricultural inputs, largely because of low purchasing power. Thus many inputs may not be available in the country simply because the volumes that can be sold are small. This is less of an issue in, for example, Kenya, where smallholders and estates make high use of inputs, than, say, Uganda, where the estate sector is small and smallholders generally have low purchasing power. For example, Kenya's imports of fertilizer were 150 000 t in 1998, compared with only 10 000 t in Uganda (Magnay, 1999). Whilst some of Kenya's fertilizer imports are re-exported to neighbouring countries unofficially, appearing in neither Kenyan export nor Ugandan import data, this does not account for a sufficient volume to eliminate such sharp differences in fertilizer consumption.

Consideration of aggregate availability may conceal some important distinctions. Fertilizer may not be available in the appropriate formulations, for instance, or important complementary inputs may not be available, thereby reducing the effectiveness of the overall package. (In Uganda, although chemicals were distributed to cotton farmers, too few had access to the spray pumps needed to apply them.)

Farming is a highly seasonal activity and inputs are needed at very specific times. Some peak needs can be anticipated (seed at planting time for instance, even if planting dates shift depending on rainfall), whilst others arise at short notice (the sudden emergence of a pest requiring rapid action to save the crop). Where inputs need to be imported at short notice, it is unlikely that the market can respond in time, and even where it is a question of distributing inputs from the capital to rural areas, information and transport constraints may prevent a sufficiently timely response.

For the farmer, the non-availability of inputs often manifests itself in the first instance in the absence of local agricultural input retailers. Farmers must generally travel some distance to locate inputs (sometimes to the capital) with no guarantee of success or affordability. Moreover, where input needs arise at short notice during the planting season, there is an especially high premium on the farmer's time, making the uncertainty and absence of local outlets all the more problematic.

ACCESS TO INFORMATION

Information constraints arise at different levels.

The information constraint is first of all apparent in the straightforward lack of reliable information on yield response to, for example, fertilizer, under the conditions and soils prevailing in farmers' fields. Application of inputs at an inappropriate time, or inputs of poor quality, may contribute to a perception of unreliable information on yield response. Fieldwork undertaken in support of this study included stakeholder workshops. Even though the small-scale farming systems in Uganda and Zimbabwe are very different, stakeholders in both countries stressed the lack of information on basic aspects, for example, crop yields, etc. Under certain conditions, and for some inputs, research has been done but the results may not be easily accessible. Nor would it seem that these are areas on which an informed consensus view can be easily reached, given the widely differing views expressed at the NRI workshops by relatively well-informed participants.

Even assuming that the information exists, it may not be within easy reach of farmers. Extension services in many countries have been severely affected by public sector budgetary constraints leaving many workers with their salaries paid but without funds to visit farmers. In many cases they are doing the best they can in difficult circumstances, but certain problems are widespread:

- bias towards less poor farmers, men and accessible farmers;
- lack of printed extension material available in local languages;
- messages not suited to conditions which prevail in farmers' fields;
- inflexibility in adapting messages to farmer needs.

As a consequence farmers rely heavily on information available from other sources:

- friends and family;
- farmers with privileged access to information, for example, those involved in trials, demonstration plots, seed multiplication or contract farming;
- NGOs and development projects;
- farmers' groups and associations;
- radio and newspaper;
- traders and purchasers of farmer crops;
- farm input retail outlets (where they exist);
- information provided with the product.

The first four are likely to have only piecemeal information expanding the farmer's knowledge, but with no certainty that s/he has sufficient information on which to make a well-informed choice between technologies or inputs.

Mass media may, in some countries, provide targeted farmer information services but in many countries provision for farming communities is weak.

Traders can be a good source of information on preferred varieties and may actually see enough farmers to gain an understanding of problem remedies that work. Companies buying particular products, or running contract farmer schemes, are more likely to have knowledgeable field agents.

In an ideal world, retail outlets would offer comprehensive impartial advice on the farm inputs available. Often, however, there is an incentive for the trader to promote a particular product, and in many areas there is no alternative supplier to which the farmer can turn for a second opinion. (Recent work by NRI in India suggests that where retailers are farmers themselves, and located within the farming community, they are more likely to offer impartial advice.) Where products are retailed in their original packaging, information provided with the product is likely to comply with international standards (giving the active ingredients, intended use, recommended rates and methods of application, and shelf-life). However, this information may be in an inaccessible form (for example, written in

small dense print, in a non-native language, using technical terms, etc.). Such inaccessibility may extend to the retailer as well as the farmer.

An informed decision on the use of purchased inputs also requires information on prices, and in thin markets (i.e. those with low and uneven volumes of transactions over time), prices can be particularly uncertain and variable. Likewise the transaction costs incurred in locating the input. Again, stakeholders at the NRI workshops in Zimbabwe and Uganda considered this an important issue affecting smallholder access to purchased inputs.

Farmers need information on the safe use of chemicals and the means of compliance with such recommendations. Whilst development projects stress these aspects, and international companies 'cover' themselves with the information they supply with their products, the reality is that farmers are often unaware of particular risks. Even if they are aware, they may be unable to apply the input in the recommended manner (making use of protective clothing, for instance, or accurately mixing chemicals to the recommended strength).

Another issue which arose at the NRI workshops concerned the standards set/regulated by the public sector, and farmer/retailer need for information on how to assess input quality where such standards do not exist or are unreliable. This applied particularly to seed viability and arose in the context of government plans to privatize seed production and sales units.

RISK AND UNCERTAINTY

Farmer willingness to purchase inputs is also affected by risk and uncertainty.

Low and uncertain rainfall is closely linked to low use of purchased inputs, since it creates additional yield risk. Most African agriculture is rain-fed, only 8% of cereal production is irrigated, compared with 20–40% in other developing regions.

Where output prices are volatile, farmers may be unwilling to apply inputs for fear that they may not cover costs. Maize prices in Uganda are a case in point. They are subject to major fluctuations largely on account of large, 'lumpy', unpredictable relief purchases for neighbouring countries. In some

years, maize is a highly profitable crop for farmers, whilst in other years, other crops offer much better returns.

The quality and suitability of a particular input is a further source of uncertainty. Chemicals, in particular, are often very specific and expensive and farmers will be reluctant to apply them unless confident of their suitability. Unviable seeds are another problem. Whilst suppliers may willingly replace or refund when seeds are found to be unviable, planting has to be repeated and the ideal sowing date has passed.

Some farmers are aware of northern market concerns about the use of chemicals, and in some countries there may be a small local market for organic products. Organic export schemes are becoming established in developing countries – in some cases merely putting a more profitable label on long established practices. This may add to farmer uncertainty on the use of purchased inputs, particularly inorganic fertilizer, chemicals and genetically modifed crops, because of his/her concern about being able to market the crop, or because of concern over local environmental harm.

COMMERCIAL CONTEXT

There are a number of ways in which the commercial context affects the use of purchased inputs. These issues overlap with some of the other topics already discussed, but as a group they offer an additional explanation for overall levels of input use. These issues were highlighted particularly by stakeholders at the workshop in Uganda where most farmers were characterized as operating partly or largely in a non-commercial way, but with important exceptions in areas bordering Kenya, where marketing is easier, and has taken place without disruption for a much longer period than is typical elsewhere in areas subjected to long-term civil disruption.

Farmers' expectations of being able to market their crop at a remunerative price are an important determinant of willingness to use purchased inputs. Although market prices may vary, some will be subject to larger fluctuations than others (Ugandan maize, for example). With sufficient experience, farmers may, nonetheless, develop technology strategies which are robust in the face of expected price variation, or where resources permit, may be able to take a calculated risk on the likelihood of covering costs.

Where debt amnesties and subsidized credit programmes have been common, it may be more difficult to establish viable credit schemes than in situations where those taking out loans expect to repay them. Viable credit schemes need to have the capacity to impose penalties, but if these become the norm rather than the exception, the cost of enforcing repayment may become excessive. Smallholder credit schemes in Uganda and Zimbabwe provide contrasting evidence of financial discipline. In the former, there are few examples of viable farmer credit schemes, with strategic default common. A private scheme mounted by one of the cotton companies found that although they had planned to seize assets in the event of default, this was socially and politically impossible to enforce. In Zimbabwe, however, the private cotton companies have managed to enforce such measures and have achieved high repayment rates in excess of 98% (although interestingly the state-run Agricultural Finance Corporation has suffered high rates of default among the farmers with whom it deals).

Many parts of rural Africa are poorly connected to local towns, and not well served by specialist retail outlets, crop traders and transport networks. Although farming is the single most important source of livelihood in most rural areas, it is often extremely difficult to obtain farm inputs. In recognition of this, government offices (often extension units), NGOs and projects may market some inputs. The absence of retail outlets is not limited to farm inputs. It affects all sectors and reflects the limited purchasing power of farming communities.

When taken together, these factors which reduce access to inputs, combine to create an additional disincentive: high and unpredictable transaction costs. Trading in small quantities, to dispersed markets, with irregular, seasonal demand, contributes to high transaction costs (low volume transactions incur the same fixed 'negotiation' costs as those for higher volumes, and also incur higher unit transport costs than could be negotiated for regular or larger shipments, exacerbated by lack of competitive pressure). High transaction costs incurred by the trader translate into higher retail prices, and in addition to these, transaction costs incurred by the farmer contribute to uncertainty and conflict with alternative uses of his/her time and resources.

In Uganda, it is often argued that years of civil strife made many farmers adopt low risk, food self-sufficient farming strategies. In this context,

farming was not really a business, more a means of producing food for the household, subject to certain constraints. Although most parts of Uganda are now more secure, commercial sector development is only taking place slowly. Yet where increased pressure on land necessitates greater use of purchased inputs, it is useful to emphasize the *business* aspect of farming because it is only within this financial and trading context that farmers are likely to recognize that careful use of selected purchased inputs is a viable strategy. The situation in Uganda is probably more extreme than that experienced in many countries, but the principle nonetheless has wide application. Farmer willingness to use purchased inputs depends in part on the overall commercial environment, including the extent to which farming decisions are influenced by business (profitability) criteria.

3

IMPROVING ACCESS: RECENT EXPERIENCE AND BEST PRACTICE

This section provides a menu of practical ways in which constraints to purchased input access can be addressed. Drawing on recent (1990s) African experience, the material is presented in two main sub-sections:

- the use of credit to improve access to purchased inputs;
- mechanisms to improve input access that do not rely on credit.

These different approaches were developed as a response to different country and farmer circumstances and each has its strengths and weaknesses.

USING CREDIT TO IMPROVE ACCESS TO PURCHASED INPUTS

Four approaches are discussed:

- cotton farmer credit schemes used in Uganda;
- cotton farmer credit schemes used in Zimbabwe;
- intensively managed outgrower schemes;
- extending banking services to smallholders.

Cotton companies taking a joint loan to provide inputs for farmers in Uganda

Liberalization of the cotton sector in Uganda led to substantial private investment in ginning. Ginning capacity greatly exceeded the cotton harvest. Farmers, who had bitter memories of low state-controlled cotton

prices and an unreliable voucher payment system, were unwilling or unable to buy inputs (even seed). Whilst the cash payments made by the privatized ginneries were gradually attracting more farmers back into cotton, this alone seemed insufficient to boost output as rapidly as the ginners hoped. The initial response by one of the larger ginneries was to launch an ill-fated input credit scheme (for seed and pesticides). The scheme proved disastrous as the majority of smallholders defaulted on their loans, due to a combination of side-selling (avoiding repayment of loans by selling to another ginner) and a poor harvest (it was the *El Niño* year). It proved impossible to enforce the purchase agreements and attempts to seize assets proved unworkable.

In order to remove the possibility of side-selling, the Uganda Ginners and Exporters Association (UGEA) was formed, with compulsory membership of all cotton ginners. For the 1998/99 season, the UGEA financed the input credit scheme from a Bank of Uganda loan, guaranteed by the Ugandan Government. The Cotton Development Organization (CDO), a parastatal formed when the sector was liberalized to provide co-ordination and regulatory services, played a critical role in the development and operation of the input credit scheme. The CDO has co-ordinated the distribution of cottonseed and pesticides. Smallholders are free to sell their seed cotton to any ginner. The ginners are responsible for loan repayment, and these costs are met through a levy payable against volumes of cotton ginned by each ginner. (Volumes are assessed by independent monitors assigned to each ginnery.) Average (not individual) input costs are factored into the seed cotton price paid to farmers (and all farmers, bar those registered in an organic scheme, receive the same cotton price irrespective of the quantity of inputs supplied to the individual farmer). Side-selling is prevented by removing the option of selling to alternative buyers: all ginners are members of the UGEA so it is impossible for a farmer to sell cotton to buyers outside the scheme. Levy avoidance by individual ginners has been reduced by the presence of monitors in the ginneries and dialogue with border officials and spinning factories, where ginners (or farmers) may try to make illegal sales.

The scheme is certainly not problem-free and suffers from:

- difficulties assuring the timeliness of input delivery;
- diversion of inputs by intermediaries responsible for their distribution, or attempts to charge farmers for the inputs at the point of delivery;

- inputs given out to non-cotton farmers and cotton farmers going without;
- farmers using the inputs on other crops, or selling them;
- too few spray pumps with which to apply the chemicals;
- farmers do not have the opportunity to make an informed decision based on the cost and benefits of pesticide application;
- getting ginners and government to agree to the scheme seemed to depend on assurances that costs to farmers and ginners would be contained; as a consequence, an unrealistic harvest forecast was used (which virtually assured a government subsidy in the form of the loan guarantee) and farmers were told that input costs would be shared 50:50 by farmers and ginners (this was deliberately misleading – the input loan directly affects the price ginners can afford to pay farmers);
- more efficient producers pay more for their inputs (because they sell more cotton, and a uniform deduction per kilogram of seed cotton sold is made for the cost of the inputs) whilst less efficient producers face lower cost inputs;
- critics contend that the scheme is vulnerable to rent-seeking at all levels.

Moreover, the sustainability of the scheme is in question because: the element of subsidy (its first year of operation turned out to be heavily subsidized by the Government guarantee because the levy on cotton volumes ginned was based on an over-optimistic harvest forecast, and CDO's own co-ordination inputs are currently provided without charge to the industry); the absence of capacity-building to help farmers make appropriate production decisions; and 'leakage' of inputs which may threaten the intended impact on output. Yet for the next year, the ginners plan to take out a commercial loan with private crop insurance to cover a shortfall due to natural disaster and this 'stake' should provide inherent pressure (on CDO) for a higher quality (less 'leaky') operation.

A scheme with so many problems cannot be described as a model yet it is an interesting example of a pragmatic stop-gap measure to increase farmer productivity. Its coverage is impressive – around 300 000 smallholders who are, to a certain extent, self-selecting resource-poor farmers (because although now low risk, cotton is not very profitable, and, therefore, unattractive to farmers with other choices or able to bear more risk). The challenges are essentially two-fold: to improve the operation so that the benefits are maximized whilst containing the cost; and simultaneously to build longer term farmer capacity through extension and group activities.

Cotton companies in Zimbabwe providing inputs on credit to farmers

In contrast to Uganda, there has been no co-operation between the three ginning companies in Zimbabwe, although all rely to some extent on smallholder cotton production. Two of the companies operate input credit schemes. Both companies have a similar approach for overcoming the problem of side-selling.

- All borrowers belong to groups of cotton smallholders. Default by one member of the group brings retribution to the whole group, which may be subsequently excluded from the scheme. This increases incentives to repay. It also encourages group members to monitor and help one another to ensure that there is no default.
- Groups performing well receive cash rewards.
- If defaulting occurs, the companies act swiftly and come down heavily on defaulters, seizing assets when necessary.
- Local agents of the cotton companies are in year-round contact with smallholders, building closer relationships and a sense of loyalty to the company.
- Services are provided in addition to the input credit: extension advice is provided, and one company has recently introduced cash loans. Again, these additional benefits of 'belonging' to a company help to strengthen relationships and loyalty.

Individual farmer participation in the input scheme depends on repayment records, acceptance by other members of the group, and the achievement of a certain minimum yield. Around 25% or 53 000 smallholder cotton farmers participate in the schemes, and in contrast to the Ugandan situation, these tend to be the more able farmers. The schemes are intended to help such farmers expand production, whilst other farmers are expected to make cash payments for inputs.

Schemes in both countries are still in their infancy. In Uganda, the performance of the UGEA scheme cannot be fully judged because it has only been running for one season. Box 1 compares the performance of the two schemes based on the information currently available. One interesting conclusion is that although the Ugandan scheme is far from being a model farmer credit scheme, its coverage (and in particular, its ability to reach poorer farmers) is extremely impressive. The Zimbabwean schemes may

Box 1 The performance of the cotton input schemes in Uganda and Zimbabwe

	Zimbabwe	Uganda
Repayment	1997/98 season repayment rates for the two schemes were 98% and 100%.	Only 50% of input loan repaid – an unrealistic harvest forecast resulted in low per kilogram cotton repayments by ginners and virtually assured that government guarantee would apply.
Coverage	1998/99 season (both schemes): 53 000 smallholders This represents about 25% of smallholder cotton farmers, generally farming on communal or resettled land (small plots, unirrigated and typically on marginal land).	For 1998/99 season. Cottonseed distributed to around 300 000 smallholder farmers, typically farming on small unirrigated plots. The scheme is intended to reach all cotton farmers (except those enrolled in a separate organic scheme).
Efficient use of inputs	Although no data are available, inputs are likely to be used efficiently. • Input use is closely monitored and extension advice is provided. • Farmers pay for inputs so have good reason to use them wisely. • Inputs are supplied at cost price (cheaper than local market prices due to bulk buying by cotton companies and no retail margin).	Evidence of significant 'leakage'. • Inputs not necessarily available when needed in a form that farmers can use (i.e. too few spray pumps). • Perverse incentives which encourage less efficient producers and discourage the more efficient. • Monitoring and extension advice is provided but reports of diversion of inputs and late delivery were widespread.
Subsidies	One scheme includes a small element of concessional funds from a former World Bank loan at below market interest rates. The other scheme is partly reliant on low interest Agricultural Finance Corporation loans.	UGEA used donor funds loaned at below market interest rates backed up by a government guarantee. CDO do not charge for the logistics support provided (government/donor funds used for this). UGEA's inability to repay loan amounts to 50% subsidy.
Contribution to cotton sector development	Smallholder credit contributes to increased production but significant numbers of producers do not use it.	Production credit almost certainly a critical component in cotton sector recovery. UGEA plan to continue scheme with commercial loan and insurance cover.
Wider development impacts	Potential to expand financial services available to cotton farmers (e.g. savings schemes) with wider development impacts. Group approach helps build community-level capacities.	Whilst cotton production may increase farmer incomes, the present input scheme does not contribute to wider farmer benefits relating to, for example, group capacity-building and financial discipline.
Sustainability	Appears sustainable: • subsidy is small • capacity-building • demonstrated ability to repay • process permits further development.	Questionable: • unless costs can be significantly reduced • inputs more focused on intended beneficiaries • dependence on subsidy reduced.

represent best practice in credit delivery, but the beneficiaries are principally (and deliberately) the more able farmers.

Zimbabwe's experience with intensively managed outgrower schemes

The term 'outgrower scheme' is often reserved for schemes where agri-business has considerable control over the smallholder production process, providing a large number of services, such as input credits, tillage, spraying and harvesting. The smallholder provides land and labour in return for this comprehensive extension/input package. The high value horticultural export sector is currently the focus of considerable outgrower scheme development (for example, Hortico in Zimbabwe and Homegrown in Kenya).

European supermarkets are the main market for horticultural exports from sub-Saharan Africa. Quality requirements are exacting in terms of physical appearance and food safety, which in turn requires highly developed technical and managerial production skills. In addition, supermarkets need to be able to trace produce back to the grower. Together, this implies a close working relationship between the farmer and the exporter, and a sophisticated system for providing agricultural services. In these schemes, the high cost of the service provided by the company involved is justified by the high value of the final product.

Hortico in Zimbabwe operates an outgrower scheme producing and exporting babycorn and mange-tout beans to the European market. Success has been achieved by establishing a thorough supervisory system and rigid enforcement of standards. By early 1999, 3000 farmers were contracted to sell their produce to Hortico at a price guaranteed at the beginning of the crop cycle; 60% of participating farmers are women. The amount grown by each farmer is restricted. This ensures that production of other crops is not neglected, whilst adequate attention is devoted to the export crop. Training, technical support, inputs and spraying are provided by the company, and farmers provide labour, land and irrigation (using watering cans). Contact between the company and the farmer is frequent, a lorry visits each farmer every second day. This reduces the possibility of side-selling. Cost recovery on inputs is nearly 100%.

Close monitoring of farm operations, a high level of technical support, and frequent contact with the smallholders, are required to operate outgrower

schemes successfully. There may be scope for increased use of producer groups to reduce costs of the schemes and allow some of the services provided by the company to be assumed by the group. Such schemes allow smallholders to participate in high value export sector development, producing specific products to exacting standards, whilst export companies find that the labour-intensive nature of some of the crops is ideally suited to small unit operations.

Piloting rural banking services in Uganda

In 1998 Uganda's Centenary Bank commenced a pilot scheme targeting financial services to smallholders. The scheme is currently operated at one branch only (Mbale), though if successful it will eventually be extended to all their branches (currently 12, though planned to increase to 24 by 2002).

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. In other schemes where loan security has been the overriding concern, mechanisms such as group-lending have been used so that peer pressure can substitute for collateral. Regular and frequent repayment instalments are another means by which loan security (i.e. repayment of the loan) can be safeguarded.

The Centenary approach places the emphasis on ability to repay. Loans are made against a projected cash flow. Household budget analysis is key: after the initial application, a Bank Field Officer visits the household to carry out an analysis of household income and expenditure, based on all 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 also been trained in rural finance. As such, they are able to recognize the agricultural potential of a farm, and judge the profitability of the activities that will contribute to loan repayment.

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

In Uganda the scheme is particularly innovative, because recent experience with loan schemes has been poor. (Civil war, free input schemes and frequent loan amnesties have been blamed for this.) Early indications are that the scheme is viable and will be extended to other parts of Uganda.

IMPROVING ACCESS TO PURCHASED INPUTS WITHOUT USING CREDIT

Credit is so often considered a key issue in expanding smallholder access to farm inputs, that a surprising result of the NRI research and workshops in Uganda and Zimbabwe, was the wealth of experience with schemes which deliberately avoid such an approach.

Six approaches are described here:

- a seed and fertilizer hand-out scheme in Malawi;
- a scheme to sell inputs when farmers have available cash in Zimbabwe;
- tailoring seed services to farmers' needs in Uganda;
- strengthening the informal seed systems;
- strengthening commercial input distribution networks in Uganda;
- public/private partnerships in farm inputs and extension in Zimbabwe.

The Malawi Starter Pack Scheme

The Malawi starter packs are intended to meet a short-term food security need and address the longer term issue of declining soil fertility. They are a response to growing food deficits and poverty in Malawi, and fertilizer prices which are too expensive for most farmers following the economic reforms of the 1980s and 1990s. The packs contain cereal and legume seed, and fertilizer. Each rural household receives one pack, enough for 0.1 ha or 60–100 kg of additional maize. The scheme is an initiative of the Malawi Government and donors.

The scheme commenced in 1998, with the distribution of 2.53 million packs. The actual cost of the project was US$ 25.12 million (approximately 70% more than anticipated). The distribution of the packs (involving government agents as well as contracted services from private transport companies and NGOs) worked well with relatively few problems considering the scale of the operation and the time available.

Preliminary findings (Kate Longley, personal communication) indicate that few households followed the instructions to plant a 0.1 ha plot with seed and fertilizer. The instructions were written in Chichewa, and not understandable by non-Chichewa readers or non-literate people. Where farmers chose not to use fertilizer or seed, this was due more to the view that fertilizer was unnecessary or the seed inappropriate to the location than the desire to sell the inputs. The groundnut seeds were regarded as being of poor quality and seldom planted. Where they were, germination was poor.

Government field assistants did not provide much advice to smallholders. A lot of their time was spent in registration and distribution, which interrupted normal activities.

The incremental yields appear to be between 60 kg and 80 kg. Highly variable output prices make it difficult to put a precise value on this output but preliminary indications are that the return on the cost of the pack is only 1:1. In spite of its longer term objectives of the gradual (over 5–10 years) spread of improved technologies among smallholder farmers, the starter pack scheme is largely perceived as a free inputs scheme, and a short-term safety net.

Selling cotton inputs in Zimbabwe when farmers have sufficient cash

In Zimbabwe three companies buy and gin smallholder cotton. The smallest of the three does not operate an input credit scheme, and has no plans to do so. Company officials consider input credit unnecessary because their supply requirements can be met from large-scale producers and from smallholders outside the other companies' input credit schemes. In addition, they wish to avoid the significant administrative burden they perceive from operating such a service. Instead of being offered credit, farmers can purchase inputs for the following season when they sell their seed cotton, with no obligation to sell the next season's crop. Such a system has the advantage of not indebting smallholders, who in the current economic climate (in November 1998 annual inflation was 35%, and market interest rates were over 40%) may be reluctant to take credit for fear of long-term indebtedness. High inflation also makes advance purchase of inputs attractive to those farmers who can afford to do so.

Tailoring seed services to farmers' needs in Uganda

The Uganda Seed Project (USP) is a parastatal established in the 1960s to meet smallholder seed requirements. Its operations include extensive contract farmer seed multiplication schemes, quality assurance and seed distribution. It concentrates on maize and beans although smaller volumes of other grains and oilseeds are also supplied. As of 1999, plans are being made to privatize a large part of its operations. In the run-up to privatization there has been considerable analysis of the problems it has faced and the implicit challenge to a new owner.

There are about 2.5 million farm families in Uganda who must use seed from one source or another. The vast majority of them are small-scale farmers. Uganda's agro-ecological conditions permit the cultivation of a diverse range of crops. Theoretically this should offer enormous opportunities for seed companies. In practice, however, the use of improved seeds has eluded the majority of farmers. Of the estimated annual seed requirement for maize (10 000 t) and beans (90 000 t) only 15% and 1%, respectively are supplied by the formal seed sector. Box 2 summarizes the issues confronting USP in meeting farmer demand.

Box 2 What farmers need from seed suppliers

Technical effectiveness	Good performance under farmer conditions/constraints. Known response under different weather patterns or in different agro-climatic zones.
Reliable quality	Quality often not obvious until crop maturity/harvest so quality assurance particularly important. Genetic quality hard to guarantee with old varieties (used in Uganda for beans and groundnuts) – requires deliberate, rigorous maintenance breeding scheme. Need robust systems to assure physical and physiological quality. Inefficient delivery systems, poor infrastructure, the hot humid climate and low levels of farmer literacy, have also contributed to quality assurance problems.
Availability	Timeliness. Availability at location convenient to farmer. Supply of crops/varieties farmers want, concentrating on those which informal channels cannot service.
Pricing	Farmer willingness to buy seed depends partly on multiplication factor and market value of crop. Farmers less willing to buy seed which is costly (low multiplication factor) unless crop has high market value. Low yields compound reluctance to use purchased inputs.
Packaging	Required unit size (i.e. in small units). Provides adequate protection/quality assurance. Provides information.

Providing smallholders with seed at a price they can afford is not likely to be problem-free for any organization in Uganda. Climatic variability, poor infrastructure and security problems all play a role. However, the USP experience does provide some lessons and some of these can be addressed with appropriate investment and systems, irrespective of the exogenous constraints on supply.

Informal seed systems

Farmer sources of seed can be divided into four categories: own seed, neighbours, local market and commercial seed. The informal system comprises the first three. In Africa, farmers are often said to be dependent on informal sources for 90% of their seed needs. Table 2 illustrates this with data from the Machakos area in Kenya.

Table 2 Seed sources as a percentage of total seed use in Machakos area, Kenya (short rains, 1983)

	Own seed (%)	Commercial seed (%)	Neighbours (%)	Local market (%)
Maize	83	12	1	4
Sorghum	77	8	8	5
Bean	89	2	2	7
Cowpea	80	2	8	10
Pigeonpea	81	1	2	15

Source: Muhammed *et al.* (1985); de Bruijn *et al.* (1994), cited in Longley and Richards (1998).

Informal seed systems are likely to remain important. Even in developed countries, a significant proportion of seed planted has been retained from the previous harvest. Once farmers have first acquired improved open-pollinated varieties, they may subsequently use saved seed or informally traded seed. Vegetatively propagated planting material, such as cassava, is almost entirely dependent on informal sources – a point that became abundantly clear when cassava mosaic disease in Uganda suddenly created a need for large quantities of clean planting material which could not be met initially by local sources.

In addition, agricultural systems in Africa are subject to rapid change as a result of market liberalization (and changes in prices that affect choice of technology and crop) and pressure to intensify. This means that informal seed systems, notwithstanding their present effectiveness, will have to adapt and change to meet different needs. This may have implications, for example, for varietal selection and storability. NRI's work in Kenya, Malawi

and Ghana has indicated strong demand for improved varieties and anecdotal evidence from Uganda echoes this, at least for open-pollinated varieties.

Box 3 explores three aspects of informal seed systems: their attributes (both positive and negative), ways in which they can be strengthened, and intended outcomes. This is analogous to current thinking in rural finance where there is a perceived opportunity to build on the strengths of informal systems (notably in outreach), with some of the knowledge or technology used by the formal system. There is very little experience in either area, and a need exists to pilot and review such models.

Strengthening commercial input distribution systems in Uganda

The Ugandan Government's Agribusiness Development Centre (ADC), with support from the United States Agency for International Development (USAID), has done considerable work on the intensification of maize and bean production. This focuses on the use of improved seed, fertilizer and crop management, sometimes with small quantities of chemicals, to increase yields and reduce costs of production. ADC works with the extension services and NGOs to expose farmers to these technologies using small demonstration plots (to compare traditional and improved systems), field days and farmer site supervision to reach approximately 120 000 farmers per annum. Rather than using credit, farmers have been encouraged to draw on their own resources, and to make these investments a high priority. ADC stresses the business management aspects of farming.

Rural areas are poorly served by farm input networks and farmers usually lack information on purchased inputs. An additional focus for ADC has, therefore, been to try to bring inputs physically within reach of farmers, by providing support to the input supply chain, i.e. wholesale importers, district distributors and village stockists. The support provided under ATAIN (Agent Training and Input Network) comprises:

- mediation between the parties concerned;
- a loan guarantee (on which there has so far been no call);
- training (product knowledge, safe use and handling, marketing, record-keeping and business management).

Box 3 Exploiting the potential of informal seed systems

Attributes of informal seed systems

1. May be considered better value for seed which is:

- bulky and, therefore, incurs high transport costs (e.g. grains and legumes)
- openly traded (e.g. grain) such that farmers know the price (e.g. grain)
- easily stored
- self-pollinated (and hence subject to slow genetic deterioration).

2. May be the only source of crops and varieties needed in small quantities to meet local preferences, or suited to local, temporary or evolving conditions; local varietal selection tends to yield seed which performs well locally.
3. Likely to be more accessible in rural areas.
4. Informal sources can supply seed on a timely basis (or not at all).
5. Informal systems are more robust in the face of major disruption (such as civil war) but more vulnerable to local climatic risk than formal systems sourcing seed more widely; aid agencies buy seed in Uganda for relief programmes in neighbouring countries, and these 'lumpy' purchases lead to extreme volatility in the prices and availability of formal sector seed.
6. Some crops which are almost entirely dependent on informal seed systems (e.g. roots and tubers) are also those valued by farmers vulnerable to disaster (whether man-made or natural) because they can be kept in the ground until needed.
7. Informally sourced seed cannot be certified, but it can be 'truthfully labelled'.
8. The quality of farmer-saved seed tends to be good but subject to variable storage management (work by NRI in Zambia and Ghana suggests that these practices are often 'passed down' and probably not discussed much within the community); seed management also tends to fall outside the extension system (extension officers often take leave after the harvest, and are preoccupied with their own demonstration plots at planting time).

Ways in which informal seed systems can be strengthened

1. Providing them with access to NARS/IARC-bred foundation (/breeder) seed.
2. Extension advice on seed production, processing, treatment and storage.
3. Supporting a legal framework that permits the marketing of uncertified, 'truthfully labelled' seed which would conform to the prescribed standards regarding the genetic purity, germination and moisture content for that variety, except that it would not carry an official certification tag.

Intended outcomes

1. Greater availability, accessibility and affordability of seed which has locally preferred characteristics.
2. Improved quality and reliability of seed sourced informally.
3. Greater integration of modern varieties into traditional seed systems.
4. Identification and wider dissemination of local varieties whose characteristics make them suitable for wider cultivation.

ATAIN facilitates trade between five regional distributors and village stockists, by guaranteeing small loans (made in the form of inputs advanced) to the stockists by the distributors. There has been no call on this guarantee so far, and stockists are not aware that the guarantee exists. There are roughly 180 stockists participating in the scheme and all have benefited from the guarantee.

The stockists also provide critical extension on the products and the product training provided to the stockists has proved to be one of the most popular components of the project. Just as stockists are able to be extensionists, some government extension agents have become stockists as well. If these distribution systems can be sustained, the challenge will be to maintain objectivity in the advice provided by stockists.

Should stockists choose to advance inputs to their customers, without first receiving full payment, ATAIN has no role in this transaction. (Certainly such arrangements occur and village-level stockists are well-placed to assess the credit risk before entering into such informal agreements.) An estimated 30 000–40 000 farmers have benefited from improved access to inputs. Despite these achievements, and the fact that ATAIN is operational in one of the most agriculturally progressive parts of Uganda (Mbale and Kapchorwa), smallholder demand for inputs is still very low (around 500 t fertilizer/season).

The ADC is also working on output marketing to enhance farmer confidence that his or her harvest will be sold at a fair price. This pilot scheme illustrates the potential to improve access to inputs and underlines the importance of co-ordinated action on technology transfer, input supply and output marketing.

Public/private partnerships in farm inputs and extension in Zimbabwe

With growing emphasis on the communal sector in Zimbabwe, input companies are turning their attention to this potentially large market. Box 4 describes a number of pilot initiatives experimenting with ways to increase communal farmer access to purchased inputs. Each of these has different characteristics but all use partnership approaches and incorporate extension. (Although one of these also uses credit, it is included here to illustrate the potential when different players collaborate.)

Box 4 Piloting public/private partnerships in extension and inputs in Zimbabwe

- Input supplier links with the Grain Marketing Board, Zimbabwe Farmers Union and transport brokers to reduce transport costs and exploit warehouse storage available in rural areas.
- Input supplier links with cotton marketing companies to sell inputs at the point of cotton sale (orders are taken, paid for, and farm delivery subsequently made by the input company).
- Input company links with other input companies, government extension services and farmers groups, with extension costs met partly by the input companies with no conditions attached. (For example, Novartis has been working with a number of local companies and supplying Agritex staff with motorbikes, which they subsequently are able to buy, with payment by instalments.)
- Input companies working with NGOs and local retailers to support the development of local retailer networks (by providing training and loan guarantees).
- Collaboration between cotton companies, banks and input supply companies, to transfer farmers who reliably repay input loans from company schemes to bank schemes, with the banks aiming to strengthen their rural outreach and savings mobilization.

ALTERNATIVE APPROACHES TO INPUT CONSTRAINTS

Box 5 summarizes how each of these schemes affects the key constraints identified in the previous section. The schemes' impacts are fairly evenly spread across the five constraints (affordability, availability, information, risk and uncertainty, and commercial context) and virtually all schemes perform well in at least four of the five areas. Most of the schemes help reduce risk by providing farmers with better information (on the appropriate input to use, and recommended methods of application) or by an explicit link to crop marketing. The table could be used as a check-list to identify areas for improvement in poorly performing schemes. The Malawi scheme, for instance, would be improved by better extension on the inputs distributed and recommended practices.

Box 5 How different input schemes affect key constraints to farmer use of purchased inputs

Scheme	Affordability	Availability	Information	Risk and uncertainty	Commercial context
Uganda credit	More affordable – factored into crop price	Improved – but timeliness still a problem	Information on input package	Risk reduced and decision taken out of farmers' hands	Little or negative effect
Zimbabwe credit	Improved – via credit	Little direct effect	Package includes extension	Links to crop marketing reduce risk	Reinforces commercial approach
Outgrower schemes in Zimbabwe	Improved – input credit integral to package	Improved access to marketing system and required inputs	Package includes extension	Risk reduced and decisions taken out of farmers' hands	Participation in export development – though approach is rather paternalistic
Uganda Centenary Bank	Improved – by credit	No direct effect	Some additional extension advice	Reduced a little through extension and planning advice	Farmer encouraged to be 'business-like'
Malawi Starter Pack Scheme	Improved – inputs are free	Improved – otherwise hard to obtain	Some extension – but inadequate	Free inputs shield farmer from some consequences of risk and uncertainty	Little or negative effect
Input sales when crops sold	Improved by timing of sales	Inputs made available at location suited to farmer	Little direct effect	Little direct effect	Farmer encouraged to be 'business-like'
Farmers' seed needs in Uganda	Improved by small unit size	Timing, location and seed type all important	Little direct effect	Risk reduced if seed is of reliable quality	Farmer can more easily develop farm business
Informal seed systems	Affordable local sources	Improved	Reinforces informal sources	Risk reduced – locally suitable	Farmer can more easily develop farm business
Building commercial input systems in Uganda	Little direct effect	Vastly improved	Retailers give product and safe use information	Information and crop marketing component helps reduce risk	Farmers can more easily plan/develop farm – and commercial networks expand
Partnerships in Zimbabwe	Some effect on costs via more efficient use of transport	Improved services – including delivery of inputs to farm	Improved through collaboration on extension	Information helps reduce risk	Helps develop rural economy and services

4

PRIORITIES FOR POLICY AND DIRECT INTERVENTION

GETTING THE PRIVATE SECTOR INVOLVED IN SMALLHOLDER INPUT CREDIT

Credit is often considered the major issue in increasing farmer access to purchased inputs. Yet smallholders are almost invariably poorly served by the formal financial sector on account of high transaction costs associated with small loans, a dispersed rural clientele, and poor information on crops and marketing. In some situations, however, the private sector (notably processors or traders) may be willing to extend input credit to smallholders in order to overcome a supply constraint. Box 6 summarizes the factors that influence the viability of such input credit schemes.

The significance of these categories, and particular aspects, is that they need not all be present for a scheme to work, but most schemes will need to incorporate several aspects to ensure a degree of success. For instance, the Ugandan cotton example relied on buyers forming an association (second crop market characteristic in Box 6), but for the scheme to succeed it was also necessary for inputs to be provided in-kind, and to incorporate several measures from the *modus operandi* group (e.g. monitoring, extension and accessibility). The scheme can then function, even if the overall commercial context is weak.

The Zimbabwean cotton credit example indicates that even when few favourable crop market and input conditions are present (fertilizer and cash are available on credit in Zimbabwe), it is nonetheless possible to develop strong and viable input schemes. The success of the schemes in Zimbabwe is dependent on the presence of favourable conditions relating to overall commercial context and *modus operandi.*

Box 6 Factors which affect viability of commercial crop input credit schemes

	Effect	
Crop market characteristics		
Crop purchase monopoly and little food/farm use of crop	+	*
Possible for all buyers/users to form association and little food/farm use	+	*
Multiple marketing channels and/or food use	–	
Input qualities		
Inputs provided in-kind	+	
Limited alternative use or market for input	+	*
Returns to input use are greatest for the crop in question	+	*
Commercial/credit context		
Farmers treat farm as a business and are integrated into markets	+	
History of loan amnesties, default without penalty, subsidized inputs	–	
Supportive legal/political/contract enforcement institutions	+	*
***Modus operandi* of scheme**		
Group schemes for peer pressure	+	
Group or individual schemes backed up by monitoring/good information, support staff and ability to act	+	
Incentives for repayment and penalties for non-repayment	+	
Appropriate incentives for field monitors/co-ordinators	+	
Training provided to farmers – extension and business management	+	
Developing relationship/trust/loyalty through field presence/contact	+	
Accessibility of scheme – minimize red tape and transaction costs; organize so location and timing of contact is convenient to farmers	+	
Effective and timely monitoring of input use and crop marketing	+	

* Denotes killer assumption if stated condition does not exist.

So-called 'killer assumptions' are also identified in Box 6, i.e. conditions which would be favourable (for the operation of a credit scheme) if in place – but rarely are so. They include: crop purchase monopolies, which are increasingly rare; situations where all buyers can form an association effectively creating a crop purchase monopoly; inputs that have no other use or cannot be put to any other comparable profitable use; and supportive institutions for contract enforcement (the importance of which is particularly stressed by Dorward *et al*. (1998)). The latter is included because although many countries may have appropriate legislation or policy, there are often compelling political economy, implementation and access factors that prevent its effective operation at a local level, or for particular groups. Also, the buyers' association approach (similar to the Uganda cotton example described earlier) may be difficult to apply in practice, because of unwillingness to take joint action. The fact that

favourable conditions rarely apply means that a viable scheme is necessarily dependent on several measures which could be described as best practice in lending to small-scale farmers.

Box 6 lists a number of 'carrot and stick' measures (under *modus operandi*) which do not depend on unrealistic assumptions about, for instance, the ability to enforce contracts using legal mechanisms (which even if possible, would probably be very transaction cost-intensive). Their focus on groups, training, monitoring and incentive systems makes them initially costly but once in place, farmers can take on a greater share of these costs (groups can act as crop assembly points and distribution points for inputs, reducing the transaction costs inherent in reaching many small farmers). Moreover, these measures build group/individual capacity so that farmers are able to combine their knowledge of, for example, land characteristics and agronomy, with information about inputs, and use this to make informed decisions about input use. Without this capacity building, technology packages tend to be inflexible (and, therefore, not ideal in all situations) or costly in terms of extension (as seen, for instance, with some of the intensively managed smallholder outgrower export horticulture schemes in Africa). Nonetheless, the implicit start-up costs, and the fact that the benefits are long-term (and also far wider than just the crop in question) mean that they are only likely to be attractive to companies able to take a longer view.

Such best practice mechanisms in rural lending are robust to different situations. For instance, they are similar to the measures used by Grameen Bank type schemes where inputs are not necessarily provided in-kind or targeted to a particular crop. This approach, moreover, yields benefits even where the marketing structure does not demand such an approach. (The cotton company in Mali, for instance, which has a crop purchase monopoly, nonetheless uses virtually all of these measures to reduce transaction costs and increase cotton output.) There seems to be a clear lesson here for Uganda also: whilst it is difficult to envisage a preferable viable alternative to the existing scheme given current conditions and circumstances (and this is true, despite all the problems in the operation of the input scheme), it does not obviate the necessity and desirability of investment in longer term measures aimed at more sustainable and substantive improvements in smallholder productivity. At the same time, it may be more difficult still to get commitment to such long-term goals amongst a large group of companies (approximately 30), including many that have only participated reluctantly in the scheme.

NON-CREDIT MECHANISMS THAT MAKE INPUTS MORE AFFORDABLE

In Uganda, seeds could be made available in packet sizes more closely suited to farmer needs. Had appropriate packing plant been installed from the outset, this would have added little to the unit costs of seed.

In Zimbabwe, input and cotton companies have collaborated to sell next season's cotton inputs when farmers sell their cotton harvest. This arrangement is beneficial to all concerned without locking the farmer into a credit agreement that s/he may find difficult to honour, and the cotton company may find costly to monitor/enforce. From the cotton company's perspective, it is a relatively low-cost way to promote increased cotton production, whilst the input company can make extra sales with relatively low transaction costs. (Inputs are delivered to the farmer subsequently so transport costs are incurred by the input company but savings are made in rural retail and storage costs.)

In Zimbabwe, there has been collaboration between the cotton companies, the input companies, transport companies and the banking sector, to reduce the cost of farm inputs and services. Information has been shared to enable transport costs to be reduced by the co-ordination on input and output marketing. The banking sector has been able to 'adopt' reliable agricultural borrowers (with the banks benefiting in the medium-term from access to rural savings), enabling the cotton companies to achieve greater coverage with their own loan programmes.

The most obvious way to improve affordability is through subsidy, though this is rarely considered a sustainable option. In Malawi, inputs were distributed free of charge to farmers but this must be regarded as an exceptional response to an evolving crisis. Whilst subsidies clearly do not offer a long-term solution, they may be able to play a role where they can be carefully targeted and progressively reduced, or focused on particular constraints within the distribution system. The ATAIN project in Uganda provides a type of subsidy in that it provides an input (a guarantee) which would not otherwise be available (or would not be available at reasonable cost). Yet the hope is that this need not be unsustainable, because by demonstrating the viability of the input distribution system, the perceived risk (and hence cost) of involvement in input supply may be reduced.

ADDRESSING OTHER FACTORS THAT CONSTRAIN SMALLHOLDER ACCESS TO PURCHASED INPUTS

All the interventions described in the previous section addressed four of the five issues identified: availability, information, risk and uncertainty, and commercial context.

Availability

Improved availability of inputs is emphasized by most of the schemes reviewed. There is good reason for this and much evidence to suggest that it is a more important constraint than affordability. IFDC (1990), cited by Larson and Frisvold (1996), reports that on average, farmers in sub-Saharan Africa must travel 18 miles to the nearest fertilizer supply point. Larson and Frisvold's conclusions (IFDC, 1990 p. 522) emphasize the availability constraint:

> ''Several studies document that the simple physical availability of fertilizer to farmers, in appropriate quantity packages and at the appropriate time of the year, remains a constraint to increasing fertilizer use in sub-Saharan Africa.''

Several authors, including Shepherd (1989) and Larson and Frisvold (1996) point to the inevitable role of the private sector in improving input availability. In promoting this role, it is important that consideration be given to the fact that private rural suppliers choose between different products, for example, tinned food, soap powder, and farm inputs. The ATAIN programme in Uganda, which focuses explicitly on the development of commercial input networks, does not emphasize the need to improve returns to fertilizer marketing *relative* to those obtained from other products retailed in rural areas. Rather, ATAIN demonstrates that inputs can be retailed profitably but the way in which it links this, responsibly, to training in safe and appropriate use of inputs, almost certainly adds significantly to retailing costs relative to those incurred on other products.

Interestingly, the private initiatives in Zimbabwe implicitly take account of this by using retail points where synergies with other activities (and hence economies of scope) can be exploited (sharing transport costs, and marketing inputs alongside output purchases).

Access to information

The need for better farmer information on inputs and yield response is widely stressed, and is reflected in the extension component included in some of the input schemes reviewed. The importance of extension in improving the performance of input credit schemes is also widely recognized. Improved information helps reduce the risk and uncertainty to which the farmer is exposed when adopting new technologies.

The information constraint is partly an information *flow* constraint, but there are also some fundamental gaps in knowledge on the technical and economic effects of improved use of purchased inputs and other crop management strategies. Although some of the necessary research has been conducted (even if the results are not available, nor the conclusions updated to reflect current prices), much has not, even in countries which have accorded a relatively high priority to agricultural research (such as Zimbabwe). As the pressure to intensify and develop packages which African farmers can and will adopt increases, the need for research and dissemination on farmer-adapted input and crop management strategies becomes more critical.

For example:

> "No work has been done to revise, in view of changing soil, variety, and economic conditions, the recommendations developed during the early 1960s...
>
> While introducing fertilizer as an essential input to achieve yield increases is important, it is equally important that the correct message on nutrient requirements by crop and by area is delivered. The information presently available in Uganda on fertilizer nutrient requirements for Uganda's crops and soils is inadequate". (IFDC, 1999, pp. 11–12).

There is a key role here for publicly funded research. The private sector is unlikely to do this research because it would be difficult to recoup such costs through product sales. (Smallholders have limited purchasing power, and the most useful research is likely to focus on synergies between farmer-supplied and purchased inputs.) In many countries, a useful starting point would be to collate and review existing information before

identifying priorities for revision, updating and new research. The latter comments may be particularly relevant to donor-funded activities.

Risk and uncertainty

Four categories of risk and uncertainty are identified in this study: weather risk, market risk, uncertainty over input choice and quality, and uncertainty over export market acceptance of produce treated with chemicals.

The schemes reviewed in the previous section relied principally on two mechanisms to reduce risk and uncertainty: the provision of extension advice to improve farmer knowledge on the correct choice and use of purchased inputs, and links with output markets, such that the farmer would be confident of selling his/her produce. Implicitly, most of the programmes assured 'fair' retail prices for inputs, and some were able to offer lower prices on account of bulk purchase orders (e.g. cotton inputs in Zimbabwe). ATAIN argues that it tackles market risk (i.e. uncertainty over output price) by improving the overall profitability of the farm enterprise, such that a fall in output price is less critical.

Although farming is to some extent an inherently risky activity, there are some other ways in which risk can be reduced. There is always a degree of weather risk but in Uganda, the UGEA was negotiating commercial crop insurance to cover the loan taken out for cotton farmer inputs, in the event that natural disaster should lead to a significant reduction in the expected cotton harvest. From the farmer's perspective, there may be little that s/he can do to reduce this risk, except by diversifying, and cultivating some known drought-tolerant varieties. New varieties will carry a higher perceived risk, and the risk of crop failure in the event of poor weather conditions may indeed be higher. Moreover, the stakes will be higher still if other purchased inputs have been used.

For some crops, unpredictable output prices are the major risk. Interventions which lead to better market integration (i.e. smoother flows of produce between surplus and deficit areas) will help to reduce (but not eliminate) this source of risk. This might include improvements in infrastructure (roads, telecommunications), financial services (such that traders can more easily finance their operations), deregulation of rural transport and trading to increase competition, and better information on farmer production and market prices. In some countries, where large

unpredictable purchases of food crops for relief programmes in neighbouring countries contribute to price volatility, it may be possible for the government to negotiate with the donors to obtain advance notification, and to smooth such purchases (over time and crops) where possible.

Improved information on inputs (including information on input quality assessment criteria) will help to reduce the risk perceived by farmers in using purchased inputs. The government can also play an important role in setting and enforcing appropriate product standards, for example, in seed quality. Where the government is itself involved in the supply of seed or inputs, it should ensure that these meet the highest standards. (A failing of the Malawi scheme was the poor germination rate of the groundnut seed distributed.) Farmers often also face uncertain prices for inputs. In Zimbabwe, input company representatives at the NRI workshop proposed that input prices in rural areas should be monitored, because they feared that unnecessarily high retail prices were undermining the scope to develop the smallholder market.

Commercial context

The overall commercial context affects the production and marketing strategies adopted by farmers. This not only affects output marketing options, it influences the availability of retailers/traders willing to supply farm inputs. Transaction costs are reduced as commercial activity increases, and as the rural economy develops, more services become available and affordable in rural areas. Government policies on market reform and competition (for example, in transport and banking), and infrastructure development, influence these trends, though on their own they may be insufficient to fuel economic development in particular areas. At the micro-level, extension programmes might reinforce these tendencies by stressing farm budgets and marketing, but trends in the rural economy are likely to have a greater bearing on farmer activities.

Governments and donors, however, need to consider carefully how their actions and programmes affect the development of sustainable commercial services in rural areas. In Uganda, private companies argue that the establishment of viable rural farm input networks is undermined by subsidized input programmes in Uganda and neighbouring countries. Such programmes, which are normally donor-funded, are popular with farmers and politicians alike. They are often undertaken as an emergency

response, making it still more difficult to build an effective consensus around the need to minimize this type of action. The input companies, moreover, agree to supply them, thus undermining their own position (though in the absence of co-ordinated action, if they did not do this, they would simply see lucrative contracts go to their competitors, without any progress towards the development of commercial networks). Yet, the emphasis accorded to this problem in Uganda suggests that there is a need to review the impact of such actions and develop alternative strategies that offer greater prospects for the development of sustainable supply networks in the medium term.

POLICIES TO PROMOTE SMALLHOLDER ACCESS TO PURCHASED INPUTS IN AFRICA

Building on the conclusions above, policies to promote better access to purchased inputs can be divided into two groups:

- agricultural sector policies;
- policies to promote general market development and competition.

Agricultural sector policies

- There is a need to avoid agricultural input interventions that undermine the development of sustainable commercial input distribution networks or contribute to poor financial discipline (such as subsidized input schemes and loan amnesties). In dialogue with donors, NGOs and private companies, governments should seek to develop alternative strategies to deal with emergency needs that assure longer term development goals.
- Support is required for the development of the farm input sector with appropriate standards and regulation, information and training. There is also a need to identify appropriate channels for dissemination, exploiting opportunities in the commercial and voluntary sectors, as well as with extension services and farmer groups or community-based organizations.
- Promotion of public/private/NGO/farmer partnerships is important to improve farmer access to purchased inputs. This process should include identification of appropriate roles for government agents (for example, in extension partnerships, or the pivotal co-ordinating role played by CDO in Uganda). The process also implies building farmer

group capacity, since the latter can act as a vehicle for extension, input distribution, crop assembly and participation in wider consultative processes.
- Research and information gaps need to be filled with respect to the use of purchased inputs, especially combination packages that exploit synergies between farmer-supplied and external inputs.

Policies to promote general market development and competition

- There is a need to undertake further market reforms and liberalization, for example, in relation to agricultural marketing (inputs and outputs), financial services, and transport, to improve availability and competition in rural services.
- Ensuring that the appropriate legislative frameworks and contract enforcement mechanisms exist is important, as is accessibility to the groups for which they are intended.
- There is a need for further development of rural infrastructure, particularly relating to roads, telecommunications and electrification, and support for effective maintenance systems for all these facilities.

Although these last three policy areas are not specific to input markets, they contribute to the overall context in which the farming sector develops. The four areas identified under agricultural policy, however, provide some clear pointers on government actions to promote access to farm inputs, whilst the earlier analysis provides guidelines on the nature and design of direct interventions likely to succeed. Without exception, the latter depend on constructive dialogue and collaboration between public and private agents.

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ABBREVIATIONS

ADC	Agribusiness Development Centre (Uganda)
ATAIN	Agent Training and Input Network
CDO	Cotton Development Organization (Uganda)
GDP	gross domestic product
HYV	high yielding variety
IARC	international agricultural research centre
IFDC	International Fertilizer Development Center
NARS	national agricultural research system
NGO	non-governmental organization
NRI	Natural Resources Institute
UGEA	Uganda Ginners and Exporters Association
USAID	United States Agency for International Development
USP	Uganda Seed Project

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