

# ZIMBABWE'S AGRICULTURAL REVOLUTION REVISITED

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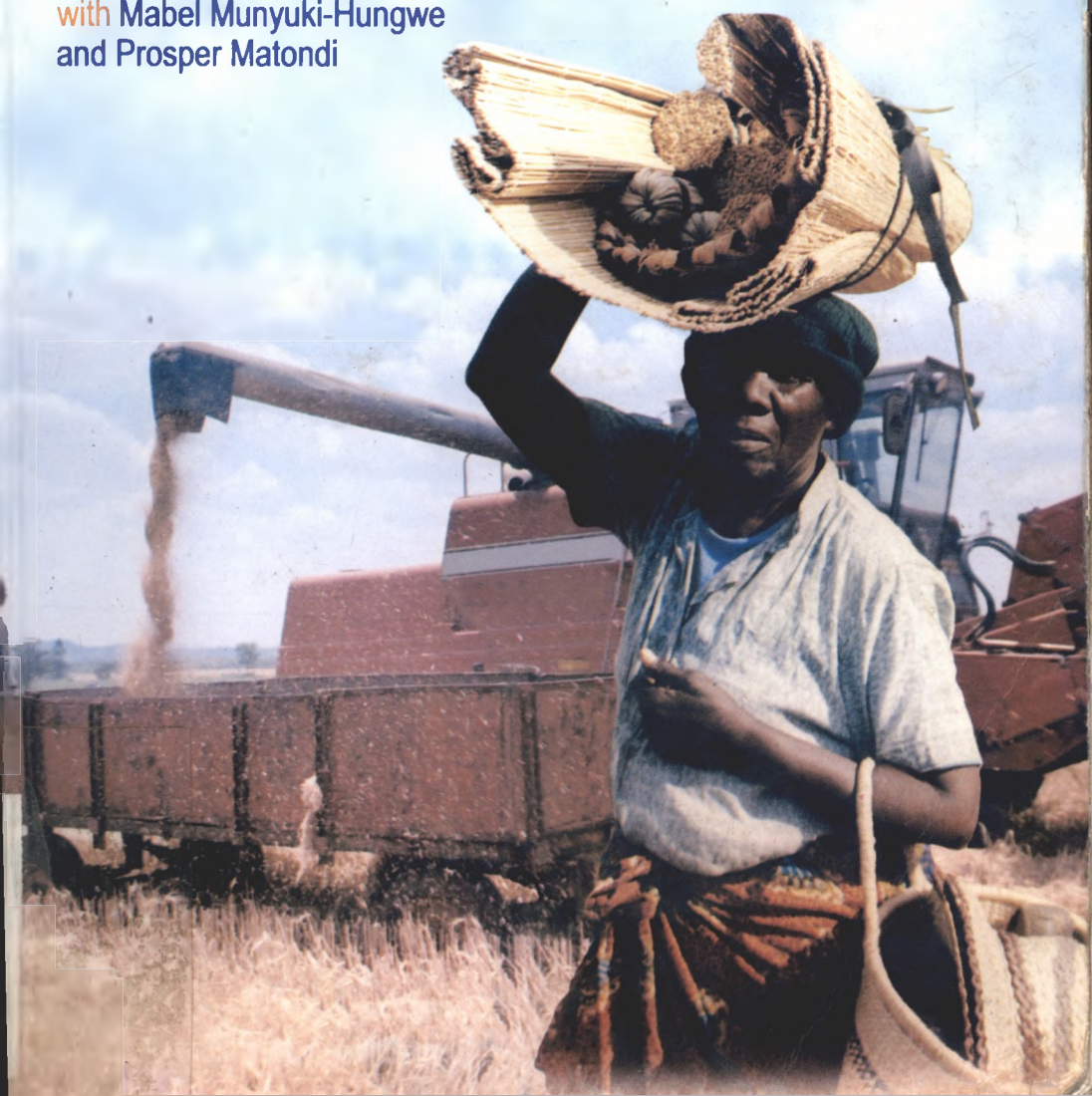
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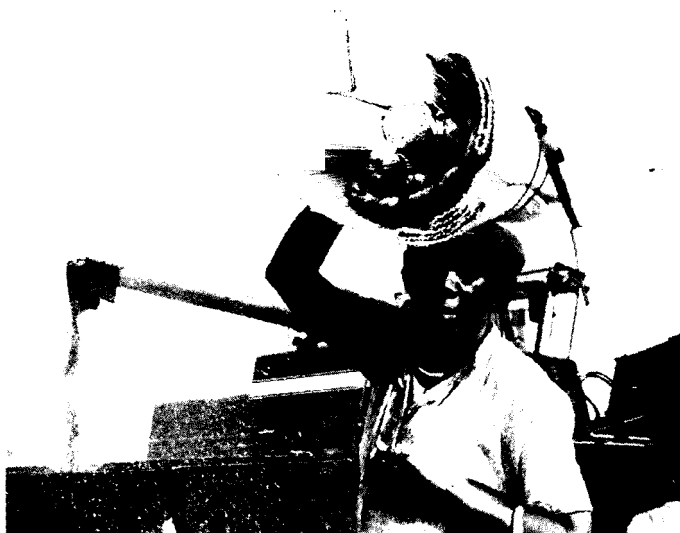
Carl Eicher

with Mabel Munyuki-Hungwe

and Prosper Matondi



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Mandivamba Rukuni, Patrick Tawonezvi  
and Carl Eicher  
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Africa needs to harness the indigenous knowledge that exists among its people

## Indigenous knowledge, African voices and transformation of southern African agriculture

*Malcolm Blackie*

In southern Africa, as in much of the continent, most families are poorer and hungrier than they were 50 years ago. While Africa is a diverse place with many problems to which there is no single solution, the focus in this chapter is the southern Africa region (with particular emphasis on Zimbabwe). The purpose is to show how, through careful and effective use of the indigenous skills and knowledge of Africans, solid progress can be made in addressing the very real problems faced by so many of Africa's poorest citizens.

### **Escape from despair**

Outside support for African development is diminishing – not because the problems are solved, not because funds are being diverted elsewhere but because of a growing recognition that existing models have failed and new strategies are slow in coming forward. Too much of what passes as development literature for Africa is poorly rooted in reality. National development resources, modest from the outset, are increasingly scarce as treasuries struggle to reconcile demands for debt repayment, recurrent costs and political expectations. There is a growing consensus amongst development agencies in Africa that a new way must be found to help Africa. There is little agreement as to what that new way is or how it should be implemented in an environment of weak national governments, a flawed national policy formulation process and conflicting priorities – between African governments and their peoples, between donors and African governments, and amongst the donor community itself.

A new way is possible, as will be shown in the case studies which form the core of this chapter. This new way relies on two key premises. Firstly, the capacity of indigenous talent to drive change in Africa is consistently underestimated and undervalued. There is a real opportunity to draw on the experience of a critical mass of Africans with 'can do', initiative, and enthusiasm. Secondly, the fundamental productivity issues faced by most African farmers (who are smallholders) are often those for which agricultural experts have few, if any, realistic answers. Nor can the farmer turn elsewhere for counsel. In a period of unprecedented change, farmers find that their traditional wisdom pro-

vides limited guidance. The scale of the problems facing African agriculture is such that the continent will require long-term continuing external scientific and technical support but in a highly collaborative and interactive mode. Indigenous knowledge which is the fundamental construct upon which this chapter relies is an active and dynamic concept. It draws on expertise and information from within and outside farming communities but with consistent and long-term indigenous leadership and vision providing direction and guidance.

## **Destruction of smallholder agriculture and loss of indigenous knowledge**

African traditional farming systems, mostly based on subsistence, have proved inadequate to meet the challenges posed by the rapid population growth of the last half century. The annual per capita cereal production in Africa, which averaged 144kgs in 1970, dropped 9 per cent to 132kgs by 1997. Average African farm yields for important cereals (maize, rice, sorghum and wheat) lag far behind other regions – 1.3 tonnes per hectare compared with 2.2 tonnes per hectare in India, 4.8 tonnes per hectare in China and 3 tonnes per hectare worldwide. Between 1967 and 1997, the subregion expanded cereal cultivation by 31 million hectares and roots and tubers cultivation by 8 million hectares in the context of the green revolution. By 2002 an estimated 30 per cent of African children suffered from chronic malnutrition (Fernandes *et al.*, 2002).

In the late nineteenth century, forced European occupation and settlement of African lands resulted in significant long-term effects which continue to play out today. Importantly, colonial authorities developed long distance transport and communications, opening up a whole new range of possibilities to Africa's farmers. As a result of increased access to new crops and outside markets, agricultural production from African smallholders boomed in the early part of the twentieth century. Cocoa, coffee, cotton, tobacco and groundnuts became major smallholder export crops. Agricultural change based on experimentation and technological innovation blossomed. Farmers diversified into new crops and new varieties were readily accepted and tested. But at the same time, populations were growing at an unprecedented rate throughout the continent,<sup>244</sup> mainly as a result of the introduction of modern medicine and hygiene. Farmers found it harder to move to new lands. Soon, over large parts of the more densely populated countries of Africa, the traditional long rotations were no longer possible. In the search for new areas to live, farmers found

<sup>244</sup> The most rapid growth in Africa's population occurred after 1950, with little modern family planning being used before the 1980s. 'Until then, the inherited attitudes of an underpopulated continent joined with modern medicine to produce the most sudden and rapid population growth the world is ever likely to see' (Iliffe, 1995).

immediately following 1996 soared to four times the official price creating high inflation and even greater levels of malnutrition in the desperately poor sector of the population (the majority).

In the mid-1990s a more appropriate range of maize varieties became available but with no evident effect on aggregate maize yields. Promotion of the associated fertilizer technology over most of this period was unhelpful, ignoring what farmers know well – that the yield response to fertilizer is related to soil type, available soil moisture, weeds and previous farming practice. It was not until 1995 that Kumwenda *et al.* (1997), through a comprehensive analysis of on-farm fertilizer response rates, showed conclusively that existing fertilizer recommendations were simply unprofitable.

Malawi needed urgently to implement a strategy for broad-based income growth. A small group of Malawian policy makers, scientists and academics decided to review the options for themselves. They drew on the expertise of selected outsiders – Charles Mann of Harvard University and Anne Conroy of the Ministry of Finance in Malawi. Their conclusion was that the best way to break out of the downward spiral and to restart vigorous economic growth in a non-inflationary environment was to get hybrid seed and fertilizer into the hands of all of Malawi's farmers (Benson *et al.*, 1998). The decision was made to improve the productivity of smallholder maize-based cropping systems by the following strategies:

- Providing *all* smallholders with small packs – ‘starter packs’ – of improved seed and fertilizer for farmers to use (and appropriately modify for their own circumstances) on their own fields, the new area-specific recommendations from the work of the maize productivity taskforce;
- Ensuring that supplies of improved seed and fertilizer were readily available for purchase in all rural markets in small bags of 1–3kgs at a price which was comparable, per kilogramme, to those of existing large bags; and
- Providing opportunities for able-bodied individuals to increase their purchasing power for seed and fertilizer through a structured fertilizer (and seed) for work programme implemented during the dry season.

Starter packs were specially packaged 2.5kg packets of hybrid seed and the fertilizer recommended for that quantity of seed. Each pack would plant 0.1 of a hectare. If it yielded 1,800kgs per hectare on average and replaced local unfertilized maize yielding 800kg, then the household would gain an extra 100kg of maize on the 0.1 hectare of fertilized hybrid maize. This incremental production would feed a household for more than a month in the hungry season – a meaningful contribution to family welfare at the household level.<sup>249</sup> At the

<sup>249</sup> At 1998 prices, this was equivalent to more than a year's cash income for a poor family.



national level, 1.8 million households producing 100kgs more per household provided incremental national production of 180,000 tonnes.

The programme provided all smallholders with the means to test for themselves improved maize seed and fertilizer technology under their own conditions, without the risk inherent in purchasing the necessary inputs. It was a technology testing and demonstration programme for a small part of each farm, facilitating experimentation by farmers of promising but not yet widely adopted technologies. The effort would result in more production than an equivalent subsidy since it went directly to people who had no hope of purchasing inputs – all inputs thus generating incremental production. It would also be more robust than a credit programme for the poor and reinforced the effective operation of the liberalized market.

The vast majority of the smallholders were so short of cash that they were unable to purchase hybrid seed or fertilizer. The starter pack was small and thus likely to stimulate, not diminish, the incentive to purchase more inputs.<sup>250</sup> Even with such a small package of high productivity inputs, there were large rewards to good husbandry, especially to timeliness of planting, fertilizing, and weeding. There was thus an incentive and reward for using any inputs provided effectively. The aim was that familiarity and confidence with this recommended technology would help to expand its use; as farmers accumulated experience with hybrid seed and fertilizer, they would start buying small supplementary quantities on their own. Thus the programme would stimulate not substitute for market demand.

In the event, with the benefit of good weather, for two years running (1998/99 and 1999/2000), the incremental maize production due to the starter packs was more than double the conservative estimates of the original proposal. An outside evaluation concluded that maize production rose by 175kgs per household in the first year of the programme – almost 25 per cent of total maize production and some two months of extra food per household. In the second year, production was even higher.

The starter pack programme had its base in a well-focused, long-term maize research effort led by the Malawi maize commodity research team. The team was able to capitalize on this base through the foresight and support provided by Harvard University's consulting assistance for economic reform programmes and its research leader in Malawi, Charles Mann. The vision came from the maize team who wanted to get the results of a ten-year research effort out onto

<sup>250</sup> The package was designed to be a size that could be carried away easily by an individual on foot and not contain inputs for more than 0.1 hectare. The package needed to be small enough, at a household scale, that it really was a starter pack but yet adequate, on a national scale, to create a significant production difference when distributed to 1.8 million households.

farmers' fields. Harvard University worked with the maize team to develop viable policy options, incorporating the best of the research which could then be built into national development programmes. The British government funded the nationwide programme.

Malawi's starter pack programme was part of a national agricultural outreach strategy. It addressed the dilemma of having, on the one hand, a proven improved technology package (tested in over 1,700 farm trials) and, on the other hand, millions of smallholder farmers so poor that without some assistance, they would never afford the requisite inputs. The programme was designed to move farmers into an organic, nitrogen-supplemented system aimed at improving soil productivity as well as food production and improved household nutrition. The basic concept was to give all smallholders (over two million) a small packet of improved inputs for at least five, but preferably ten years as a central component in a long-term campaign to move the poor both towards sustained higher yields and diversified farming systems. It was to be a transmission belt for continuously moving improved technologies into farmers' hands.

While commonly called a universal distribution, it excluded Malawi's commercial farming sector and the 30,000 or more smallholders registered as commercial estates so as to obtain lucrative tobacco allotments. The practical and social difficulties of sorting out the desperately poor (around 65 per cent) from the 30 per cent of smallholders who are poor but not desperately poor seemed futile, especially as the latter group included many of the farmer leaders needed to help pioneer the new practices.

Sadly, after two spectacularly successful production years, the original starter pack exercise was changed from its original development objectives into a (reduced) targeted safety-net programme and with less productive inputs. This was done largely as the result of external pressures. Some major development agencies were strongly opposed to any form of free intervention in a liberalized economy, while others favoured the more limited objectives of a safety-net programme over the ambitious development goals of the starter pack. The 2001/02 season famine in Malawi, combined with increasing donor support for long-term and higher aid levels for Africa, revived interest in the starter pack concept.

To alleviate the famine in 2001/02, Malawi asked donors for 600,000 tonnes of emergency food aid at a cost of around US\$180 million. In 2002, the United Kingdom Department for International Development estimated that a winter starter pack, using traditional winter irrigated sites and costing US\$1.2 million could produce up to 75,000 tonnes incremental increase in maize over what would be produced without the inputs, with beans providing an additional benefit. The same investment would cover only about 6,500 tonnes of maize imports. A universal summer starter pack was planned as a highly cost-effective alternative to food aid and a means of demonstration and exposure to improved

production technology. The shift to the reduced targeted input programme is now being recognized as perhaps a case of 'too far too fast'.

The approach has much wider application than just Malawi. Small, free demonstration packs to all farmers – leaders as well as followers – is an acceptable way to move new technology out into the field quickly and the subsidy element does not involve the negative baggage of classic pervasive subsidies. The issue is generic and could have widespread application within Africa – plus having the advantage of being a real world example of African initiative and vision. It shows a viable way of taking a potentially profitable technology and extending it quickly and effectively (at reasonable cost) to poor people with virtually zero purchasing power. The need now is to incorporate this experience and knowledge into a strategy, not just for Malawi, but also for the wider poverty problem in Africa.

### **Zimbabwe smallholder cotton**

Zimbabwe smallholders (black Zimbabweans mostly farming under traditional tenure in various 'native reserves' – or, as they were previously more euphemistically termed, 'tribal trust lands') were largely marginalized by the pre-independence Smith government of what was then Rhodesia. That story is well known. Yet, in the year of independence, 1980, some 42,000 smallholders produced nearly a third of the national cotton crop. A few years later the number of registered smallholder cotton growers had doubled and they were producing consistently more than half the national cotton crop. By 2000 (a record year), over 80 per cent of national cotton production was produced by smallholders. Not only were smallholders growing more cotton than their large-scale counterparts, typically they were producing a higher quality lint through careful hand-picking and sorting before delivery. Cotton had become the biggest smallholder cash crop in Zimbabwe but, just 20 years earlier, virtually no cotton was grown by smallholders (Blackie, 1987).

Understanding this transformation requires a little history. Cotton was first grown commercially in Zimbabwe after the First World War. Favourable prices during the early 1920s led to a rapid expansion of cotton growing amongst white commercial farmers; there was no effort to interest black smallholders in growing the crop. In the event, a build-up of insect pests had devastated the fledgling industry by 1928 (Muir, 1983). A modest revival occurred with the introduction of pest resistant varieties but the increasing attractiveness of tobacco as a cash crop held back any major expansion of the cotton industry amongst large-scale farmers. The absence of promotion and training efforts with smallholders precluded their participation in production of the crop.

By 1965, tobacco, grown entirely by large-scale farmers, produced some 80 per cent of Zimbabwe's agricultural exports (Agricultural Marketing Au-

thority, 1982). In that year, Ian Smith illegally declared the then Rhodesia independent from the United Kingdom. One outcome was the imposition of international trade sanctions against Rhodesia. These sanctions had a devastating effect on traditional agricultural exports such as tobacco. To counter this, the nation embarked on a major effort in agricultural diversification and, in consequence, once again cotton became an important crop. By 1968, some 75,000 hectares of cotton were being grown (almost entirely by large-scale growers). At independence in 1980, cotton was Zimbabwe's second biggest export crop but, surprisingly (against all previous trends), smallholders were major growers of the crop.

Over the same period, Smith's government was resorting to increasingly desperate measures to control unrest in black smallholder farming areas. Ever since the first white settlement in Zimbabwe, access to land has been one of the dominating political issues. In the early 1970s, there remained large areas of 'crown land' – land for which no agreed settlement arrangements had been made. Several of these areas abutted the Zambezi valley where tsetse fly had precluded human settlement in the past. An extensive programme of fly clearance had, over quite large pieces of land, removed this constraint and the decision was made to settle smallholders from some of the more densely populated farming areas, especially Masvingo, in some of these remote but potentially productive new lands.

That was the easy part. The challenge was what to do with these somewhat unwilling settlers once they were on their new farms. Melville Reid, one of the most innovative extension workers involved with smallholder agriculture, was given this task in the Gokwe area. He reviewed carefully all the options. Through discussion with both farmers and colleagues, he devised a low-cost cotton production system suited to the family labour and cash availability of the typical smallholder household in his area. He arranged training courses for farmers and for farm advisors and ran regular field days to promote the crop.

As importantly, he worked closely and effectively with the sole cotton marketing agency in Zimbabwe at that time, the parastatal Cotton Marketing Board. Recall, this was a time when the country was desperate to build new agricultural export markets in a world which was actively working to prevent this happening. Zimbabwe needed the foreign exchange from agricultural exports – it did not matter whether these exports were produced by black or white farmers. In a tough trading environment, only high value, high quality produce would generate the margins to make the uncertainties of growing the crop worthwhile. Reid knew smallholders could grow cotton of the requisite quality. The Cotton Marketing Board participated in courses for smallholders in cotton production, pest control and harvesting methods so that the new farmers understood what quality factors were important and why. They also ran courses to explain how cotton was graded for quality.

In collaboration with Reid and others, the Cotton Marketing Board designed a dynamic marketing system that was helpful to smallholders. The grading system was fair, unbiased, simple and related to factors which the farmer could adjust. The four grades on which the farmer was paid were based on cotton colour and cleanliness (which the farmer could influence by careful reaping) and on staining (which is related to husbandry or insect damage). Payout was prompt, and there was an accessible and efficient dispute resolution process. While farmers were encouraged to bring their crop to market in standard packs, delivery would be accepted in cardboard boxes provided it was properly sorted and clean (Weller, 1983).

Transit depots where cotton was accepted and graded were established in smallholder farming areas. Depot numbers rose from five in 1980 to sixteen by 1985. Producer prices were attractive.<sup>251</sup> The proportion of the export parity price that Zimbabwe producers received was unrivalled in Africa (Dorward *et al.*, 2002). The input credit scheme launched by the Cotton Marketing Board and continued by Cottco was, in 1999, serving 55,000 smallholders with an almost faultless repayment record. Cottco (the privatized successor to the Cotton Marketing Board) remained the dominant buyer of cotton in Zimbabwe, with Cargill and Cotpro as significant competitors and, after 2001, new entrants like Boka Cotton Sales Floors, FSI Agricom and Romsdal emerged.

The Zimbabwe smallholder cotton story has several other actors. The commercial large-scale farmers set up and ran their own training centre for producers – which was open to large-scale and small-scale producers. There was constant and effective liaison between the government cotton breeders, the Cotton Marketing Board and the farmers with respect to required varietal characteristics. A reliable system of cotton seed production was put in place. Reid and his team's achievement was to link his farmers into this system so that they quickly became major, not marginal, producers. They had a clear idea of what was needed and worked closely with farmers and others to make it happen – but the vision and the direction were from Reid and his team. There were existing programmes into which they could link and they did so successfully – and adapted them, where necessary, to their own needs. The technology they were offering farmers was sound in theory and in practice. They adapted what was available and matched it carefully to the circumstances of the farmers with whom they were working. They and the farmers routinely shared information and experiences.

Thus the programme did not require a large staff and was accomplished with the constraints of public sector funding at the time. The momentum for

<sup>251</sup> There has been some interference in lint pricing as a result of lobbying from the domestic spinning industry but privatization of the Cotton Marketing Board into a new agency, the Cotton Company or Cottco in 1994 eliminated this anti-farmer bias.

expansion was provided by the linkages to other agencies with expertise and interest in expanding cotton production. Reid, as a respected member of the national agricultural extension service, was well placed to help other extension workers in suitable areas to promote cotton. They did not set up a stand-alone exercise but took advantage of the concern of the then Rhodesian government in agricultural diversification. While this contributed to a favourable environment for success, it was countered by the fact that, at the same time, small-holder farming areas were increasingly devastated by the liberation war which led to the eventual independence of Zimbabwe.

### **Making fertilizer profitable for Zimbabwe smallholders**

Zimbabwe smallholders desperately want to use fertilizer to improve their crop yields but the profitability of fertilizer use is often poor, especially in those areas where rainfall is unreliable. Moisture and soil fertility work both with and against each other. The climate of southern and eastern Africa means that moisture is a frequent constraint on maize yields and yield response to fertilizer. The efficiency (measured through grain production) of both water use and fertilizer use is raised when both are in adequate supply. The high risk of poor response to fertilizer in dry years is a major reason why most farmers in semi-arid areas use little or no fertilizer.

A good fertilizer recommendation needs to reflect both the soil and the weather conditions. The farmers (and their advisors) may be able to make inspired and reasonably accurate estimates of soil fertility conditions in advance. Foreseeing or predicting the weather is much more difficult. Piha (1993) developed and modified 'response farming' techniques that use early rainfall events to decide on the amounts of fertilizer to apply in any given season. They chose seven locations in Zimbabwe to set out response farming fertilizer trials using the dominant food crop of maize. Each site was chosen because its soil properties and past management were typical of Zimbabwe smallholder agriculture. The sites were on run-down, problem soils that were yielding poorly for the farmers who were working them. Each site was on coarse-grained, sandy granitic soils which had been cropped for at least seven years and had not received any organic manures for at least three years. Past rainfall at the sites ranged from semi-arid to relatively well watered.

Major nutrients required by maize include phosphorus, potassium and sulphur (known as P, K and S). These nutrients, if not used one season, largely remain in the soil to be available to the plant in a subsequent one. Piha decided on an efficient long-term strategy for fertility management and good maize husbandry through adding a fixed amount of phosphorus, potassium and sulphur each year. If the rainfall was poor (and thus the crop yield low), the crop would take out less phosphorus, potassium and sulphur, leaving a balance for

the following season. If the crop was exceptionally good, it would use up the balance from previous years. His experimental programme was thus designed around providing phosphorus, potassium and sulphur in amounts sufficient to meet the needs of an optimum maize crop in an average season.<sup>252</sup>

Nitrogen (known as N) is the nutrient in most demand by maize in much of southern Africa, including Zimbabwe. It is also a very transient nutrient. If the plant does not take it up, it is quickly washed out of the soil by rainfall or lost to the atmosphere due to breakdown by soil microbes. Piha's hypothesis was that the farmer would be substantially better off if the application of nitrogen in any year was adjusted to suit the rainfall pattern in that year. If the rain (and consequently the likely potential maize yield) was poor, then he added only a modest amount of nitrogen. If it was good, he added more so as to benefit from the better growing conditions and obtain better yields.

The results were very promising. Over a five-year period, Piha's system gave 25–42 per cent more yield and 21–41 per cent more profit than did the existing fertilizer recommendations. The key to the system was its flexibility. In poor years, fertilizer nitrogen use was reduced but yields would be poor in those years in any case. In good years, the farmer could get good yields.

Piha brought more farmers into the programme through selecting and training seven agricultural extension workers to fully understand how to explain the soil management package to farmers. Thirty-five farmers were loaned (not given) enough maize seed and fertilizer to plant 0.5 of a hectare (or 0.75 hectare in very poor rainfall sites). Each agreed to use the inputs only as instructed. The loan was to be repaid (in maize grain) at the end of the season. Repayment included a realistic provision for operational costs. Those that repaid their loans could borrow again under the same conditions. If a farmer was unable to pay the full amount, an arrangement was made for partial repayment.

This programme was run for three years so that the effects of poor and good seasons could be seen. All farmers also planted a separate area of maize using their traditional practices so that comparisons could be made. Each extension worker thus ended up with five good farmers using the soil management package together with fields in which they used their traditional methods. They also monitored five neighbouring but comparably good farmers who grew maize in the conventional way, and five poorer farmers who were also growing maize.

The results again were very promising. Overall, participating farmers' profits were 105 per cent higher than those of the control group of comparably good

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<sup>252</sup> Piha defines an 'optimum' crop as one which meets its yield potential as constrained by the rainfall of an average season. This definition is retained throughout this section. They used a combination of local experience and laboratory analysis to estimate the amount of P, K, and S that would be needed at any given site.

farmers. Yields were 78 per cent higher.<sup>253</sup> Loan repayment was excellent at 90 per cent. Piha also looked carefully at the results from those farmers with poorer than expected results. In most instances,<sup>254</sup> modest adjustments to specific local conditions were all that were necessary.

Piha and his colleagues (and importantly the farmers with whom they were working) were now convinced that their package was robust and workable. They had eight years of data which showed consistently, in good years and in bad, and in dry and well watered areas, that the package was much more profitable for farmers than the standard fertilizer recommendations. They needed now to see how it would work with less direct supervision from the research team. They set up a collaborative programme with a local non-governmental organization. The non-governmental organization implemented the package and arranged the finances. The research team provided technical input and advice. The results were impressive. Farmer yields and profits were double those of their neighbours. The loan payback was nearly 100 per cent. Neighbouring farmers were desperate to join the programme. So the effort was scaled up. The non-governmental organization (the Self Help Development Foundation) and Piha's group worked to carry out campaigns in selected project areas to introduce the package to the associated savings clubs.

Farmers were helped in the formation of savings clubs which were set up with specific guidelines. These guidelines, developed through discussion with farmers, required that group members be compatible, hard working and honest, that they had sufficient land and were prepared to work as a group, and that the group would be responsible for the loan. Each group comprised between 7 and 15 people and could be formed from existing project groups. Each group purchased a bulk pack of the fertilizer management package which was then divided amongst the group so that each member could plant a 0.1 hectare promotional plot. If the group worked well together and the package was acceptable, the group could then proceed in the following season to purchase fertilizer on credit from the Self Help Development Foundation sufficient for 0.375 hectares each. In 1999, participating farmers increased their profits by 227 per cent and their yields by 143 per cent over normal practice. In the 1999/2000 season some 500 farmers formed 53 savings clubs to move onto the next phase of the scheme.

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<sup>253</sup> Yield increases ranged from 55–111 per cent, and profits from 25–146 per cent greater than the comparative controls.

<sup>254</sup> At some sites, yields were reduced by shortages of other nutrients such as zinc, magnesium, or calcium. Some fields were exceptionally acidic. One important case involved the use of too much nitrogen in a particularly wet season. If maize becomes waterlogged, yields fall but the rules of the package had not included a provision for reducing nitrogen use in the case of excessively high rainfall.



Piha and his team showed clearly that with simple but different practices fertilizer use could be made profitable for poor farmers in Zimbabwe. They tested their method over a 12-year period, with a variety of farmers and over a range of seasons and ecologies. They showed that, using existing farmer groups (and forming groups where necessary) it was possible to promote and encourage the adoption of the system without bringing in whole new groups of advisors and their associated costs. Farmers clearly indicated that they liked the approach and collaborated fully throughout the period. The challenge ahead was to up-scale the programme to bring about widespread change.

## **Conclusion**

Livelihoods for the great majority of African countries will be shaped by the future development of agriculture. The Food and Agriculture Organization estimates that there are 220 million chronically undernourished, hungry people in sub-Saharan Africa. Since most people are still rural, there is typically a direct link between agricultural production and food security. While improving agricultural productivity and natural resource management cannot alleviate poverty alone, it is an important component of any poverty-related development effort. For a substantial proportion of the African rural poor, too much of the present technology portfolio is either unavailable, unsuitable or unprofitable. While efforts need to be made to get technology 'off the shelf', the reality is that much of the technology remains there for the very good reason that it is not sufficiently profitable and consistently reliable enough to be attractive to poor farmers. Too many African farmers face conditions of difficulty and stress for which both tradition and science have few real answers. It seems self evident that Africans, and particularly indigenous farmers, must search for solutions to these problems.

Creating a more favourable environment for technology adoption and development will require an adventurous new collaboration between African leaders, international assistance agencies, developed world, African universities and scientific establishments, and the private sector at both local and international levels. Central is the need for strong and consistent African leadership, supplemented by well developed and productive partnerships between African and international science. Africans themselves will need to work hard to bring the voice of the poor effectively into the research agenda. The outcome should be a balanced and interactive partnership between African institutions, African development leaders and overseas experience, with all sides playing a full role in the design and implementation of programmes. There is a need, therefore, not only for capacity building in Africa but also for sustaining an innovative and experienced community of scientists (both natural and social) in the devel-

oped world who have the ability to work as a team with the best of African science.

Much more can (and must) be done by this community, both in Africa and overseas, to take on responsibility for ensuring uptake of technology. The case studies in this chapter reveal that this is entirely possible and the outcomes are promising. African leadership is the key to creating change. Potentially, the capacity exists but too often African development leaders are struggling to work effectively in institutions which fail to fulfil even a modest view of their mandate. Well-funded overseas special interest groups distort the foreign aid agenda (Eicher, 1999).

The problems facing Africa are likely to intensify markedly in the coming decades. The rate of change needed and the impact required are such that all involved with development need to take much greater cognisance of the issues of uptake. Not all research can (or should) have immediate and widespread impact. The nature of many of the problems facing the poor in developing countries is intractable – and thus a long-term perspective is needed to complement more immediate problem-solving activities. However, even in long-term research programmes, issues of uptake pathways and responsibility for bringing the results of research into practice need explicit and early consideration, with proper responsibilities defined and thought through. For this to happen, the voice of Africans, and particularly the African farmer, needs to ring clear throughout the process.

## References

- Agricultural Marketing Authority, *Economic review of the agricultural industry of Zimbabwe*, Harare, 1982.
- Benson, T., M. Chisvo, A. Conroy, R. Gilbert, G. Kanyama-Phiri, J. Kumwenda, C. Mann S. Mughogho, A. Phiri, M. Blackie, 'Malawi: Soil fertility issues and options', a paper prepared for the Ministry of Finance, Lilongwe, 1998.
- Blackie M., 'Case study: The Zimbabwe Cotton Marketing Board', in S. Abbott (ed), *Agricultural marketing successes in the developing world*, Wiley, London, 1987.
- Dorward A., J. Kydd, J. Morrison and I. Urey, 'A policy agenda for pro-poor agricultural growth', mimeo, Imperial College at Wye, Imperial College of Science, Technology and Medicine, Wye, 2002.
- Eicher C., 'Institutions and the African farmer', third 'Distinguished Economist' lecture, CIMMYT Economics programme, CIMMYT, Mexico, 1999.
- Fernandes E., N. Sanginga, D. Spencer, E. Smaling, E. Anderson, M. Eilitta and M. Blackie, 'A consultative review of the Rockefeller Foundation's activities to improve and sustain soil fertility in east and southern Africa', a report to the Rockefeller Foundation, New York, 2002.

Iliffe J., *Africans: The history of a continent*, Cambridge University Press, Cambridge, 1995.

Kumwenda, J., S. Waddington, S. Snapp, R. Jones and M. Blackie, 'Soil fertility management in southern Africa', in D. Byerlee and C. Eicher (eds), *Africa's emerging maize revolution*, Lynne Reinner, Boulder, 1997.

Muir K., 'An economic review of crop production in Zimbabwe', unpublished DPhil thesis, University of Zimbabwe, Harare, 1983.

Piha M., 'Optimizing fertilizer use and practical rainfall capture in a semi-arid environment with variable rainfall', in *Experimental Agriculture*, 29: 405–415, 1993.

Weller R., personal communication, 1983.



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