# EVOLUTION AND CHANGE AT IITA
## The Way Ahead

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by
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# Introduction

*Mr. Chairman,*
*Ladies and Gentlemen:*

All Directors General, I am sure, look forward to an opportunity such as this when they can tell you about the progress of their institutes, and try to persuade you to continue, and if possible increase your support for their activities. I have these motives of course, but I welcome this opportunity to address you for two additional reasons.

First, because this will probably be my last chance to speak to you as the Director General of IITA. To say the least I have had an interesting and eventful four and a half years, during which I have been impressed by the way the Institute has evolved and changed; processes which will of course continue as IITA, and indeed the CG system as a whole, respond to what seems to be an ever increasing demand for their services.

Change must characterize a dynamic research center like IITA whose policies, strategies and tactics are always under review in the light of the needs of developing countries and the capabilities of their national research systems. Change is also necessary as part of the evolution of the CG system and its perception of priority problems and regions. A good example is maize research in Africa, to which I shall return later.

The second reason why I welcome this opportunity also has to do with evolution and change at IITA, for I am confident that the Institute's past research and achievements have brought it to the beginning of a new era of influence and impact in Africa — and this at a time when its work, and that of its sister institutes within the CG system, are acknowledged to be critically important for the future of food production in that continent.

It is in relation to Africa's desperate needs that I review for you our research, our collaboration with national programs and sister institutes, and our ever increasing impact. For although IITA has important and productive work in South America and in Southeast Asia, we have no doubt about our primary and over-riding objective — which is to increase the quantity and quality of food produced in the humid and sub-humid regions of Africa.

IITA is the consultative group's primary crops research institute in Africa — we have devoted and shall continue to devote almost all of our resources to work in it.

The problems that we, our sister institutes, and our many collaborators have to solve in Africa are among the most crucial in the world today. We all know of the dreadful consequences of Africa's population explosion whereby the numbers of people to be fed doubles every 20 years or so — and of the sheer impossibility of producing enough food for them now, or ever again in the future, from the traditional system of shifting cultivation and bush fallow.

**Finding a stable and economically viable alternative to shifting cultivation which will feed Africa's peoples is the central purpose of research at IITA**

Our Crop Improvement, Farming Systems and Training Programs, and the large, complex range of services which support them, have been fully operational for only about 12 years — much of that time working with less than a full complement of professional staff, and under circumstances of considerable financial stringency. This is a very short time in the life of any agricultural research institute, let alone one challenged to solve some of the most intractable and yet important problems faced by agricultural science anywhere in the world.

By any standards the results achieved have been remarkable. I would like here to express my appreciation and admiration for the hard and dedicated work of my predecessors and all the IITA staff who have made this possible.

IITA's achievements, those of its sister institutes and national programs, and my knowledge of a growing political awareness of the importance of agricultural research in the development of African agriculture, have enabled me to speak recently with a sense of optimism about the medium and longer-term prospects for food production on the continent.

I do so with considerable vigour because, while in no way underestimating the severity of the food crisis in the short term, I believe that it is important, in the face of so much pessimism, to give Africa a sense of hope for the future, and to show that there are realistic and practical solutions which Africans themselves can and must strive to achieve.

I want this morning to persuade you to share this sense of optimism, and impress upon you the critical importance of the work you support in Africa. We must believe that the next decade will see major changes in agricultural productivity there, and that the institutes of the Consultative Group will have a major role in bringing about this change. IITA is fully committed to participate in this tasks as an equal partner with its sister institutes and with African national research programs.

# The External Reviews

I would like now to comment upon the external reviews of IITA which took place one year ago. We were stimulated and encouraged by our interaction with the review panels, and by their reports which are most valuable guides to our future work. We have implemented most of their recommendations, and we have studied carefully their comments about those with which we do not entirely agree.

## The Mandate:

Of the 13 International Centers, IITA has perhaps the most diverse program of research, and it is fair to state that this is so because it has some of the most complex problems to solve. Our mandate is to increase food production in the humid and sub-humid tropics. We confirm our commitment to this objective, but at the same

time we must acknowledge pressures which tend to draw us into other ecologies in Africa.

Over the years it has been a continuing task for IITA's Board of Trustees to review this issue in terms of the mandate of the Institute, and so to guide the work of our scientists, and it was also a subject of first importance to the external review panels.

The central issue is, of course, the ecological limitation of our farming systems and related research. When, in the past, it has appeared that IITA has extended beyond the bounds of its mandated ecology, it has always been a national or regional program that has drawn it there. In grappling with this problem IITA's management and scientists are forced to be pragmatic, for we are bound to respond to the needs of political entities whose interests extend beyond the bounds of arbitrary definitions of mandate.

Our clients, and our route to the farmer, are national research organizations. IITA wants them to grow strong, and we want to catalyze them into becoming effective agents for the transfer of their own and the International Centers' achievements into impact at the farm level.

In its many efforts to assist national programs, which range from training to collaborative research, the institute is bound to go where the national interests take it. Should this be outside IITA's mandated ecology, as from time to time it must, the CG need have no misgivings about the institute's enthusiasm for coordinating its activities with those of its sister institutes.

There can be no doubt that IITA accepts and practices such cooperation and collaboration. We have formalized our relations with other international centers in no less than 14 memoranda of understanding, and one such agreement with CIMMYT which is informal and unwritten, but no less important.

Furthermore, during the past 10 years, IITA collaborated with 31 national agricultural research programs in Africa; and we presently have memoranda of understanding for on-going research and training with 12 African national programs, and with 9 universities world-wide.

These various arrangements are of great benefit to our research, and we hope, to the African countries with whom we all work. As I have already said, we attach great importance to our role as a catalyst to enhance the capabilities of national programs.

These facts belie the conception that IITA wants exclusivity within the CG system for research in sub-Saharan Africa.

What we do want, and try to achieve, is for the CG Centers active in Africa to appear to national authorities as a cohesive whole with a common critically important objective — to alleviate food deficits by home production in the shortest possible time.

## Farming Systems

I would like now to turn to the reorganization of our Farming Systems Program which has been undertaken in response to a recommendation of the external program review. The reorganization proposed, and now approved by our Board of Trustees, has as its chief purpose a significant shift of emphasis away from non-station research at Ibadan and the high-rainfall substation at Onne, towards more off-site and on-farm research.

It is moreover, a conscious shift towards a research methodology that has better connections with small farmers' agricultural systems in the humid tropics.

I think it highly pertinent to point out that this welcome shift of emphasis would have been impossible a year or so ago. The on-site farming systems research which IITA's Board of Trustees has supported strongly for the past decade was an essential prerequisite for the changes now proposed.

Faced with the complexity of the problem they were asked to solve, our scientists had first to study and analyse numerous components of the African tropical environment and existing farming systems. That work has produced the results we asked for, and provides the base of factual data for the next phase of our farming systems research which will be highly relevant to the needs of small farmers in the humid tropics.

### *The Revised Program has 4 Multidisciplinary Components:*

- Uplands Crop and Soil Management
- Wetlands Crop and Soil Management
- Agroforestry and Livestock Integration in collaboration with ILCA and ICRAF
- And, On-farm Adaptive Research conducted in close collaboration with national programs

I want to emphasize two features of this reorganization. First, we stress the multidisciplinary nature of farming systems research and have taken steps to encourage greater collaboration and interaction between the scientists of the Crop Improvement Programs and those in the Farming Systems Program.

We want this interaction to sharpen the focus of our commodity research by drawing the plant breeders into a greater involvement with our on-farm research activities, and by providing a better understanding of the environments and systems in which their improved germplasm will be tested and grown.

Secondly, I want to emphasize that we are increasing the numbers and the influence of agricultural economists and social scientists within the farming systems program, especially with regard to their role in on-farm research. Two new developments in this field are the attention now being given to household utilization and food processing of the crops in our mandate, and the role of women in agricultural production and decision making.

Another recommendation of the program review panel directed to our farming systems research deserves comments this morning because it has a significant bearing on the long-range objectives of the program, and indeed of the Institute. I refer to the one which urges our farming systems scientists to give more emphasis to the evolution of existing systems, and so, by inference, less emphasis to research which foresees fundamentally new systems.

I feel bound to state our belief that, in the long run, Africa's growing populations can be fed only if traditional systems are changed, albeit with inevitable social and political consequences. The solution to Africa's food crisis will not be by a gradual evolution of existing systems.

For example, although our research is for the benefit of all farmers, we do not believe that there can be any future alleviation of poverty, nor of food shortage in Africa, so long as the average family farm remains as small as 2 hectares. A viable unit large enough to provide excess saleable produce in sufficient amounts to give the farm family a decent standard of living must be of the order of 5 hectares. The land for such an increase in average farm size is available in Africa, but it is presently locked in the centuries old bush fallow system.

I will return briefly to this topic in a moment, but want to say first that we have been encouraged by, and wish to acknowledge the contribution of Dr. Norman Simmonds to the current farming systems debate as expressed in his recent report to the World Bank entitled "The State of the Art in Farming System Research". In particular, his concept of "new farming systems development" which implies radical, basic change in traditional systems, is one with which we must agree, however difficult its implementation may appear to be from today's perspective.

In our farming systems research on upland soils, which we define as those whose water table is always below the root zone, we believe that we have identified some of the components of new and appropriate technology required to bring about the fundamental changes implicit in a new farming systems development. There is much research yet to do, for of course there are unanswered questions, but we are encouraged by our results to date.

The essential ingredients of the changes we envisage to make possible a stable, productive agriculture where shifting cultivation and bush fallow now prevail, are relatively low input technologies which minimize erosion, nutrient leaching and weed growth, and which maximize nutrient recycling and labor use efficiency.

I refer here to the well tested package of technologies based on the concept of 'alley cropping' or 'alley farming' in which crops of improved germplasm are planted between rows of leguminous, woody perennials such as *Leucaena* or *Glyricidia*. Prunings from these trees provide up to 150 kg of nitrogen per hectare for the associated crops and, with mulches, smother weeds. Appropriate small tools and machines developed at IITA maximize the productivity of labor and decrease drudgery in alley farming.

The system replaces shifting cultivation with continuous cropping and thereby increases the size and total productivity of the small family farm.

Another feature of the reorganization of our Farming Systems Program is a new emphasis on wetlands in recognition of the great but under-utilized potential of some 20 million hectares of Africa's inland valley swamps as a basic resource for increased rice production. In comparison with the very intensive use of such wetlands to support dense human populations in Asia, this resource has been virtually untapped in Africa.

At the outset the wetlands program will concentrate on developing appropriate land and water management technologies for the small inland valleys of West Africa. Research on rice-based cropping systems and socio-economic factors will be integral parts of the program. Benchmark sites have already been selected in Nigeria and Sierra Leone and a third is soon to be located in the Republic of Bénin.

## Decentralization

I want now to comment on the question of the decentralization of IITA's core activities from Nigeria to other African countries. Our policy in this matter is, and always has been, that research opportunity shall dictate the locale of our work. We think it would be bad policy to decentralize with the primary, and perhaps short term objective of saving money.

The achievements of our past research now give us both the opportunity and the stimulus to decentralize, and we have ambitious plans to do so. We have existing decentralized activities in 7 African countries, and in Brazil and Southeast Asia, which together employ 27 staff. Planned increases in staffing in the Republic of Bénin, Cameroun and Zaïre in 1985 will bring the total staff involvement in these programs to nearly 50.

Our new center in the People's Republic of Bénin represents a major move into Francophone West Africa for both our core research and training programs. The government of Bénin has allocated 50 hectares for IITA to develop research and training facilities on the land of the University of Benin at Cotonou. Building work has already started, and we intend to have 5 or 6 core staff from the farming systems program resident there within one year.

We see further opportunity in Tanzania, and have an agreement with the new Sokoine Agricultural University at Morogoro to collaborate in a training program there, beginning in 1985.

Although they are not core funded activities, our deep involvement in cereals and root crops research in Cameroun, and in maize and cowpea research with the SAFGRAD group of countries provide excellent opportunities for our core scientists to work outside Nigeria.

***If funding permits we intend to establish decentralized, core activities in several other locations:***

- An East African center is proposed for the CIMMYT/IITA African maize program to develop germplasm for mid-altitude ecologies, and we intend to extend our farming systems research into Eastern and Southern Africa.

- We have plans for an Eastern and Southern African root crops improvement program, using IITA's existing activity in Rwanda as the base from which to begin. Eventually we would hope to have several scientists in Mozambique to provide desperately needed help with the development of cassava there, and later to use Mozambique as a base for training in Portugese speaking countries.

- Lastly, we want to establish a Caribbean root crops improvement program with scientists located in Jamaica to serve the region. We have a memorandum of agreement with the Univeristy of the West Indies which will enable us to take action when funding permits, and we expect soon to reach agreement with the government of Cuba for our scientists to work there.

While I am discussing decentralization I must refer to our work in Nigeria. We have been cautioned against becoming over-committeed to an involvement in the agriculture of our host country, but I believe that what I have just told you about our on-going and planned decentralization will convince you that we are not over-committed in Nigeria.

Of course, it is inevitable that we appear to be most active, and that we have in fact had more impact in Nigeria than elsewhere. After all, Nigeria is the most populous of the countries with which we work in Africa, and within it we find most of the range of environments, except the mid and higher altitudes, needed for our research. Furthermore, if we don't have impact in Nigeria there is little likelihood that we shall do so anywhere else.

# The CIMMYT/IITA African Maize Program

I mentioned earlier IITA's commitment to collaboration with sister institutes in Africa. The recent agreement which we have reached with CIMMYT for a joint African maize program is a significam further step in this direction, and I want to comment on it.

I believe that we should view the past events which have led to this welcome development as part of the evolution within the CG system to which I have already referred. For a decade IITA built up a strong maize improvement program and achieved major success in its attempts to overcome African specific constraints to production, most notably in breeding populations and inbred lines resistant to the streak virus disease.

This work, with the associated studies of the vector, has been a major research achievement, and a source of pride for our maize breeders. One of its consequences was to give the IITA Maize Program a distinct identity and a momentum which tended to bring it into conflict with the work of CIMMYT in Africa. The report of the external program review highlights the confusion created within national programs, who found that they were being serviced by two international centers working on the same crop.

Maize research by CIMMYT and IITA in Africa had evolved to a point where there was an obvious and urgent need for a change of policy.

That change has now been made, I am confident that the arrangement whereby a unified CIMMYT/IITA African maize program will be under the technical direction of CIMMYT's director of maize research will resolve past conflicts, and provide the basis for productive future collaboration.

# The IRTP Africa and IITA/CIAT

There have been two other recent developments of this kind to which I want to draw your attention.

The first is the agreement reached between the International Centers working on rice in Africa for an integrated international rice testing program to be implemented for Africa by IITA as a joint venture between IITA, IRRI and WARDA, and working within the framework of the global program coordinated at IRRI. We have an IRRI liaison scientist on our staff, and have an excellent working relationship with him. One of our own staff is seconded to a senior position in WARDA, and with the agreement we have now reached I am sure that we can look forward to a successful IRTP for Africa.

The second is the agreement on a major revision of an earlier understanding between IITA and CIAT in which the continuing need for cooperation and for expanded collaboration in cassava research is recognized, and in which the sharing of responsibilities is clarified.

### *Three new areas of collaboration are planned:*

- To evaluate and select CIAT germplasm for highland areas of Africa.
- To breed mite-resistant cassava for Africa.
- And to consult routinely on cassava virus research.

This revised agreement recognizes the special regional circumstancies of cassava in Africa, South America, India and Asia especially with regard to diseases. It also recognizes the contribution that both centers have to make cassava improvement, and that the time has come for them to work more closely together.

# Impact: Achievements

I will end this presentation with a word about impact and achievement. Both are very important to us, as I know they are to you, and they have received more than usual of our attention recently because of the impact study.

We know that economic impact — the area of land covered by improved varieties, the numbers of farmers who grow them, and their effects on the quantity, quality and price of food available to consumers are of the greatest importance and interest. I shall refer to a few cases of this kind of impact in a moment.

But IITA, and I expect the other CG centers, have impact in at least three other ways, none of which can be quantified.

For several years our improved germplasm has been distributed very widely in international testing programs, or directly to plant breeders in developing countries. These improved genotypes represent the products of a very large investment of our financial, physical and human resources. They are invaluable to national crop improvement programs whose breeders commonly use them as parents in crosses to develop their own locally adapted varieties.

More often than not this process is essential before our commodity programs can have economic impact. Africa is so diverse that breeding for local adaptation and for local market preference is mandatory. In this we must and do collaborate extensively with national programs.

This brings me to the second area of important impact which cannot be quantified. By our activities in collaborative, decentralized projects there is no doubt that we influence the capability and commitment of national programs through the stimulus and encouragement we give to their work and their personnel.

Nor can the impact of our training program be measured accurately, but we do believe that the 3,000 or so graduates from our courses have influenced national research and development capabilities.

May I mention in passing that teaching at IITA is done mostly by scientists from the research programs; the training office staff simply administer the program. When the inputs of scientists and support services are accounted for, we find that we invest about 5 per cent of our core budget in training. This is not obvious from our past budget presentations, but we shall correct this in the future (Table 1).

It may also be appropriate to digress here and mention forces which, were we not to resist them, would draw us away from research and into development. This is a real, and of late almost a daily problem with which we have to cope as farmers, farmers' organizations, commercial enterprises and governments come to us for help and advice to develop their projects and farms.

**Table 1: Number of persons receiving research and technology training at IITA, 1970 through 1983.**

| Continent or region | Number of countries | Master's degree candidates | Ph.D. candidates | Participants in group courses | Others | Totals |
|---|---|---|---|---|---|---|
| Africa | 42 | 102 | 70 | 1,911 | 417 | 2,500 |
| Asia | 11 | 5 | 2 | 65 | 16 | 88 |
| Australasia | 2 | 1 | 2 | 1 | 4 | 8 |
| Europe | 5 | 54 | 13 | 6 | 5 | 78 |
| North America | 2 | 6 | 5 | 15 | 34 | 60 |
| South/Central America | 17 | 1 | 1 | 7 | 44 | 53 |
| Pacific Region | 5 | | | | 6 | 6 |
| **Totals** | **84** | **169** | **93** | **455** | **2,070** | **2,793** |

In one sense we welcome this growing interest in our activities as evidence of our success and impact. These people come to us because they want our products and our help. But it also highlights a problem to which I have just indirectly referred — an inability of many national programs to disseminate the achievements of research to the farms. There is no doubt that the CG and other organizations must continue to do all they can to improve national capabilities and that in time we will succeeed.

Meanwhile we are left with the problem of responding to demands for our advice, services and seeds. I wonder how my colleagues from the other centers view this, and how they respond to such demands.

There seems no doubt that demands will continue to be made on us, and probably with increasing frequency. At IITA we think the time has come to accept this, and perhaps to institutionalize our response process.

I simply wonder if it will be in the interests of the CG, and their ultimate clients, if the centers are permitted to establish units or programs to promote the transfer of their technology — and whether such units could ever be self-financing?

Perhaps this is a uniquely African problem — but problem it is, and I seek guidance because I think we must find an acceptable and effective way to solve the dilemma that we encounter almost daily.

## *Now to hard, economic impact.*

- Improved IITA cassava, resistant to bacterial blight and mosaic virus diseases is now grown on at least ¾ million hectares in Nigeria, giving tuber yields 2 to 3 times greater than local varieties which have been replaced, and with no new inputs.

Improved cassava has been distributed and is being multiplied in 24 other African countries. Were it not for the mealybug and green spidermite the impact would already be even more impressive.

- IITA maize resistant to lowland rust and blight diseases is widespread in the Nigerian forest and savanna zones where it is grown on about 1 million hectares. It gives grain yields of 3 or 5 tons compared with 1½ tons from the local varieties which it is displacing.

Similar IITA varieties are spreading in other West African countries, and the potential impact throughout Africa of newer material resistant to maize streak virus is immeasurable. The significance of maize streak resistance is in the security it gives to the farmer once he knows that his crop will not succumb to a maize streak epidemic, such as the ones which devasted local maize in West Africa in 1983, and again in 1984.

In both years resistant varieties in test plots were outstandingly productive, and drew widespread attention and acclaim as nearby local maize failed because of the virus. Security against periodic outbreaks of streak virus gives the farmer confidence to invest in the inputs of fertilizer and of labor for timely weeding, which are both so important if improved maize is to fulfill its potential for high yield.

- Hybrid maize, developed at IITA in a program funded by the Nigerian government, has given on-farm yields in the forest zone of 4 to 8½ tons per hectare compared with 4 tons from the best open-pollinated streak-resistant lines, and 2 tons from local maize. Hybrid yields are even greater in the savanna zone (Table 2).

So ethusiastic has been the reception of the IITA hybrids that two commercial seed companies have been incorporated in Nigeria to begin the production and sale of hybrid seed in 1985. This is real impact.

**Table 2: IITA hybrid maize. On-farm grain yields in the Nigerian forest and savanna zones.**

| | Hybrid | Yield (t/ha) | % of local check |
|---|---|---|---|
| Forest: | 8328—10 | 8.5 | 157 |
| | 8322—13 | 7.6 | 131 |
| Savanna: | 8322—13 | 9.1 | 150 |
| | 8324—18 | 8.9 | 141 |

## *I have two reports for you about the impact of IITA cowpeas.*

- Variety 3236 has been widely adopted in northern Nigeria over the past three years, and demand for seed continues to exceed supply.

This success has been based on the one hand upon the multiple pest and disease resistance of the variety, and the synchronous maturity of its fruits: and on the other upon the effectiveness and availability of electrodyn ULV sprayers which have been bought by 1,800 farmers.

Insecticide is applied without added water, and with only 2 or 3 sprays a farmer can control pests on up to 10 hectares of cowpeas. Grain yields are commonly 700 kg to 1 ton per hectare, but the best farmers get twice as much.

This technology for cowpea production is entirely new to the farmers of the Nigerian savanna. They have adopted it readily because it is very profitable, and it appears to have revolutionized cowpea production there. We expect it to spread quickly throughout West Africa, especially now that the cowpea breeders have developed a variety very similar to 3236, but with added resistances to the cowpea storage weevil, two important virus diseases, and cercospora leaf spot (Table 3).

**Table 3: Yields of cowpea 3236 from farmers' fields in Kano State, Nigeria.**

| Farmer | Number of insecticide applications | Grain yield (kg/ha) |
|---|---|---|
| D. Tofa | 3 | 2,639 |
| A. Muyibir | 3 | 2,222 |
| K. Babangida | 2 | 2,222 |
| Sarkin Gelo | 2 | 1,415 |
| Dawaki Tofa | 2 | 1,389 |
| Ibrahim Dakaw | 2 | 1,217 |
| Alhaji Abubakar | 3 | 1,111 |
| Alhaji Gambo | 3 | 1,038 |

- The other impact to report about cowpeas is that of a very early variety which matures to harvest in only 60 days after sowing, and which has become known as the "*60-day*" cowpea. Planted through rice stubble soon after the harvest of irrigated paddy, it grows on residual moisture, and is the key to intensified food production in rice based cropping systems — growing two crops where only one has been grown before, or three where now there are two.

The IITA agronomist working at IRRI reports the enthusiastic adoption of this new crop at many places in Southeast Asia and in Sri Lanka. It is also spreading

among rice farmers in Nigeria, and will be an important new technology to be incorporated in our wetlands research project.

Regarding achievements with potential impact, I am sure you would like to hear something about the status of the program for the biological control of cassava pests in Africa. Recent weeks have been intense activity at the political level, with a meeting of representatives of participating African governments at IITA, a meeting of donors in Rome, and a meeting of the OAU Ministerial Council in Addis Ababa.

There remain a number of questions to be answered before the field operational phase of the program can begin — but even so we expect it will start in 1985. We remain confident that we have a technically sound program, and that biological control can be the most important means by which the terrible damage caused by the mealybug and spidermite can be most quickly and effectively combatted.

We have several other exciting research developments in the pipeline, among them the promise of breeding resistance in maize to stem borers, and to the parasitic weed *Striga* which is causing large losses in the Africa savanna zone.

We have bred excellent early maturing, drought and blast disease resistant rice for the important upland, rainfall ecology which yields about 2 tons in large scale farm cultivation.

Other new rice varieties are well adapted for lowland irrigated culture, and include some which give yields of 2 to 3 tons in iron toxic swamps. These new lowland varieties will feature prominently in our farming systems wetlands research.

Nigerian yam farmers are enthusiastic about a new technology for seed yam production which we have developed in our collaborative research with a Nigerian root crops research institute. Yam production in West Africa has been static, or has declined in recent years, largely because of the high and increasing costs of production. And this is occuring in spite of the great popularity of yams as a preferred food in the forest zone.

The biggest single cost in yam production is that of the planting material, or *"seed yam"*. For example, in the traditional Nigerian system about one-fifth of the annual crop — or around 4 million tons of tubers — is set aside to provide *"seed"* for the next year's crop. This is a huge loss of food as well as of income to the yam farmers.

In the new minisett or microsett technology very small pieces of tubers cut from *"mother yams"* are germinated in nurseries and transplanted to fields in which water is conserved and weeds are controlled with a mulch of plastic film.

This technology gives a 2 to 10-fold increase in the rate of seed yam production, and thus very large savings on the costs of growing the crop. The seed yams produced are of high quality, and give greater and more reliable yields than the traditional method. We think it will have a big impact on yam production in West Africa (Tab.4).

Table 4: Seed yam production. Conventional and improved technologies.

| Production system | Pieces cut from one "mother seed yam" | "mother seed yams" required to get seed yams for 1 ha | Cost of "mother seed" at $0.60 each |
|---|---|---|---|
| Conventional | 5 | $\frac{10,000}{5} = 2,000$ | $1,200 |
| Improved | | | |
| Minisett | 10 | $\frac{10,000}{10} = 1,000$ | 600 |
| Microsett | 50 | $\frac{10,000}{50} = 200$ | 120 |

The important role of IITA's tissue culture laboratory in distributing elite clones of our root crops as *in vitro* cultures should be mentioned. Since 1981 we have sent cassava as tissue cultures to 31 countries in Africa; and we have sent sweet potatoes to 50 countries throughout the world.

Our world collection of sweet potato germplasm is preserved in tissue culture and has grown from 300 accessions in 1981 to about 1,000 today.

I will close with a refereene to the great potential for soybean production in Africa. Our breeders have made tremendous progress in developing tropical soybeans such that germplasm is now available to open the way to the widespread adoption of the crop in Africa. These new varieties nodulate freely with the indigenous *rhizobia* in African soils, and their seeds retain viability during storage in warm, moist environments and thereby ensure good germination and crop establishment.

We intend to consolidate these achievements along two lines, first by continuing to test and adapt our new materials to the diverse environments and pests of Africa, and second, by initiating limited research on the utilization of soybeans as a means of promoting their adoption.

Mr. Chairman, there are may more interesting and important research projects and achievements that I would like to tell you about, had I more time.

My purpose this morning has been to show that IITA has evolved to a point where we can look forward with confidence to fulfilling our very important role in Africa.

I hope that I have achieved this purpose, and that I may have persuaded you to share my optimism, and my belief that, with your continuing support, there is a promising way ahead for IITA and other CG centers to make their unique contribution to future food production in Africa.