

Root and tuber crops and economic growth: The case of Sub-Saharan Africa

P. Hartmann

International Institute for Tropical Agriculture (IITA), Ibadan Nigeria

Introduction. Roots and Tuber crop scientists have done a wonderful job of furthering our understanding of root crops in sub-Saharan Africa. Root crops are well known for as 'insurance' crops and safety shields in time of drought and other disturbances, but in recent years, root crops have also become important economic drivers. This new role of root crops is the outcome of having reached the 'take-off' point into commercialization of its products and by-products. The production capacity and markets are such that root crops have moved into being industrial cash crops. This development calls for more investment into basic research, food processing and to better understand of food and labor trends in the larger urban markets of Africa and beyond. To benefit from this exciting development, we need stronger institutional capacities to tackle biological risks (threats) to root crop production such as presently posed by the mosaic and brown streak viruses.

The degree of impact root crops will have on problems of hunger; poverty and development will depend, among other factors, on research choices scientists make and resource allocation decisions by governments and donors on commodity priorities. To date, the disproportionate allocation for cereals research, given its secondary importance in sub-Saharan Africa is difficult to justify.

First of all I would like to express my appreciation for the work that you as roots and tuber crops scientists have been doing to further our understanding of these important commodities and in so doing

contribute to the betterment of millions. Your contributions to the generation of knowledge for development are legendary sometimes spectacular. Time after time, members of this association have come through to help us tackle major challenges in SSA (sub-Saharan Africa).

For us in SSA, root and tuber, from here on root crops, are important foods for humans. Root crops act as our insurance crops and provide safety shields. When it was safe to return to the villages during the devastating war, Sierra Leoneans did not find cereals, but found cassava waiting for them. When the United Nations was conducting a survey of the Southern African famine, they recorded "fields of green" and they turned out to be cassava. Such stories are repeated everywhere. Not so widely known perhaps are the new stories by countries seeking economic drivers. When Ghana's President was looking for an economic driver, he chose cassava. When Nigeria's President was looking for a stimulus to agriculture, he launched a Presidential Initiative on cassava. Whether it is cassava, yam, cocoyam, or sweet potato you are dealing with crops whose significance to the food sector of SSA is paramount.

The overall growth in the production of root crops in Africa (3 percent), versus cereals' (2.5 percent) also reflects its position. This perspective, of root crops as commercial commodities and strong drivers of economic growth is the point of my exchange with you. The commercial value of root crops has long been recognized in parts of Latin America and Asia, but is not yet widely appreciated in SSA.

It behooves us all here to continue, perhaps with an added sense of urgency, to get this message across to the public, governments, and investors. It is our assessment at IITA (International Institute for Tropical Agriculture) that of others that the take-off point into commercialization has now been reached in SSA. By this we mean the production capacity, growth rates, markets and business environments are right and that root crops have moved from being the crops of the poor, to urban foods, to industrial cash crops. We see clear examples from countries like Ghana, Mozambique, Nigeria, Tanzania, Malawi and Uganda. To encourage and nudge this exciting transition along into the commercial stage we may need to change some of our research priorities. We may need more investment in basic research and more attention to food processing, food technologies, and greater understanding of food and labour trends in the larger urban markets of Africa and beyond. We also need to encourage and assist in organizational changes of small producers and processors so that they are not left behind even while stimulating large private sector interests through research on investment potential. Finally, we need to continue to provide, through your research, the kind of investment “guarantees” you have provided in your ability to tackle threats to root crops, such as that now posed by the Cassava Brown Streak. Our inability to address such threats poses a major obstacle on the road to commercialization.

The power of these crops, especially cassava, yam and sweet potato, in our fight against poverty is worth dwelling on. One of our biggest challenges in SSA, of course is poverty. Our people and our governments are poor. In recognition of agriculture’s importance, NEPAD (New Partnership for African Development) encourages SSA governments to allocate a minimum of ten percent of their budget to agriculture. Some governments already do more. Nevertheless, the overall wealth of many governments in SSA is such that, with the exception of the

richest countries, such allocations even if doubled will not be enough. To put this in perspective, the total annual income of the most populous country in Africa is less than that of the fire department of New York City, and half of Singapore’s land transport system (Ogbeh). Some US university budgets are equivalent to the national budgets of many SSA countries. I state these facts to highlight that we are up against incredible odds and to make a difference with so little, great diligence, discipline and careful choices are necessary. It is comforting to see the rich world, and the World Bank, finally return to supporting agriculture and we will of course seek all opportunities to maintain their interest. Unfortunately, wars and natural disasters like drought continue to divert resources from development and agricultural research.

In the absence of any major increases in external sources of support and our own limited resources, we are trying to emphasize a greater reliance on internal strengths and squeeze more immediate solutions out of science. We can do the later by fully appreciating that we do have choices even with the limited funding for science and that the choices we make have implications on how much or how little impact we have on poverty. For SSA, IITA is arguing for greater allocation of resources for root crops and legumes. Investors who support the global research system, including the CGIAR (Consultative Group for International Agricultural Research) and even some national systems in Africa, have and continue to allocate a disproportionate amount of resource to cereals research. For SSA, this historical pattern of resource allocation is difficult to justify in the light of our food needs, current knowledge and sheer prominence of root crops. Like elsewhere in the World, the challenge of reducing poverty in SSA is daunting. To succeed, a complex set of dynamics must work in tandem. This set of dynamics includes the use of different commodities and their products and no single group of commodities has a bigger impact than R&T crops.

Poverty

We talk a lot about poverty so it might be worthwhile to say a few words about it. Just for clarity, we should keep in mind that poverty is omnipresence and is not confined to poor countries. Some OECD countries, which include some of the richest countries in the world, have millions of poor inhabitants. There are varying definitions of poverty but we do not have the luxury to debate the definitions of poverty or even how we measure it. The one-dollar/day measure is now widely used. Irrespective of definitions, we work on the simple fact that **poverty leads to bad outcomes**. Poverty leads to poor health and its associated costs and low productivity. It leads to poor education and wasted minds. Poverty leads to a miserable life and crime and all these outcomes work in tandem to retard progress. There is one important difference between being a poor person in a poor country or a poor person in a rich country in that **poverty in poor countries often has irreversible consequences**. Farmers from poor countries that have been wiped out of farming by a crop disaster are very likely to be themselves lost to agriculture for good.

A child that has missed an educational opportunity probably has missed it forever. Poverty means facing some very tough, normally unacceptable, choices. Resource limitations sometimes force poor societies and their equally poor governments to choose between, for example, educating one group (e.g., children) over another (e.g., adults) or addressing causes of poverty and forsaking those presently in poverty. Another example of a bad outcome is the death of infants. Sadly, about fifty percent of this loss can be attributed just to poor nutrition or the lack of food¹. Here is a critical entry point for ISTRC members in our common search for ways to reduce poverty and we will revisit it.

Poverty and Agriculture

The relation between poverty and agriculture is unfortunately mostly appreciated in

professional circles. This is not sufficient and we need to broaden this appreciation over a wider audience (Schultz). The fact remains that it is difficult to deal with poverty without dealing with agriculture, in particular agricultural productivity and the rural sector as a whole. Even for the urban poor the success of agriculture is vital to them. The relations between poverty and agriculture are, in very large part, rather straightforward. If we aim to improve both rural and urban poverty, we must affect agricultural productivity. Productivity improvements in agriculture lead to increases in food production, which leads to cheaper food. The availability of cheap food carries enormous benefits for poor consumers, which includes both the farmer and the urban poor. This benefit is a direct reduction of their food bill, which normally makes up a very high percentage of their total expenditure. A ten percent reduction in food prices would contribute almost half that or more in increases to the real income of the poor.

The benefits do not stop there because to reduce the cost of food we have to produce more food. As more food is produced and moves from the farms to the urban areas, economic activities, small and big, are generated all along the way in production, collection, grading, storing, transporting, consolidation, processing and resale. These activities create employment and income opportunities for both the rural and urban poor. In addition to the economic benefits, the availability of cheap food, and thus greater access and consumption of food, contributes directly to improved nutrition for the poor. This in turn contributes to better health. At this level of income, more food is good. Access to cheap food often translates to increased food consumption, which improves nutrition, reduces child mortality. These positive outcomes themselves add to economic gains through fewer sick days, higher productivity, and less medical and funeral expenses. In SSA at least, the power of agriculture productivity as a tool for poverty reduction cannot be overstated.

Approaches to Poverty reduction

How does one approach poverty reduction and what role for R&T in such an approach? If we begin at the global level you will notice that the first goal of the **Millennium Development Goals** (MDG) is the eradication of extreme **poverty** and **hunger**. There is a good reason why the words ‘poverty’ and ‘hunger’ are together. We can do a lot about hunger with agriculture. Another powerful fact is that we can also tackle hunger in a way that contributes to reducing poverty. The focus on agricultural and rural sector is very profemale and all the known benefits of a gender positive program: Local production, wealth creation and Risk Reduction: The IITA Approach: In our case at IITA, we approach poverty reduction via three concepts – local production, wealth creation and risk reduction.

Local production

In contributing to poverty reduction and economic growth, we argue for an emphasis on local production. We argue for local production because it is the more stable way of improving livelihoods, of increasing food security, and contributing to more long-term and broad based economic growth in developing countries where the bulk of the poor reside. Within the developing countries, the poor reside mostly in rural areas and derive their livelihood directly or indirectly from agriculture. Producing locally is also another form of providing some slight protection against global market factors. Local production has the added advantage of keeping investments local, which benefits rural development as incomes generated in rural areas tend to be invested locally.

Investing in the rural areas also slows down the rural to urban migration. Once the immigrants get to the urban areas, most become the urban poor. Addressing the urban poor is an even greater challenge, as few know how to deal with it and most interventions directed at the urban are more costly than

those for the rural. “No sector will employ as many people as agriculture. No sector will contribute as much to the gross domestic product and no sector will bring as much stability”. However for this to happen many things need to happen. Our infrastructure is very limiting as are our market information systems.

Countries in SSA, globalization notwithstanding, actually might need to continue depending more on local production any way because what is available does not correspond with what is desired. The exportable foods from the industrialized world include only a few of the commodities we consume in SSA. Food exports from the industrialized world are dominated by cereals and do not, for example, include our favorite root crops on which over a third of SSA depends.

In addition, purchasing foods overseas requires purchasing power and foreign currency, both of which are in short supply. On a longer time horizon, changing food habits in the industrialized countries may translate into a reverse situation where more foods from the developing countries are needed by the industrialized ones, as their consumers demand even more variety from the tropics and elsewhere. Such trends present an opportunity for developing country products, where traditional exports have dropped by more than two-thirds (FAOSTAT). One can already find many types root crop products in cities in the Northern Hemisphere. This bodes well for root crops but there are some challenges ahead.

Wealth creation

We have mentioned the value of producing more food and its effect on both the urban and rural poor. The wealth creation concept is simple. It says take what the poor produce and make it earn more for them. If a farmer sells a root crop product in one form we can help them sell it for slightly more. Simple processing, can improve their income. Commercial processing, of course, improves the incomes of even more people. Nigeria is

aiming to create over a billion dollars per year from economic activity in processing, marketing and foreign currency savings from root crops. In essence such activities help move the commodity and its products into other uses. The degree of impact we have on the poor depends on what choices we make in defining the problems and what research we decide to do. On the other side of the same wealth creation coin are the risks producers face and the need to manage or avoid them. Your continued contribution to this dimension is desperately needed. Adopting this path may imply a slight change in our research to emphasize more processing and food technology.

Risk reduction

The rural sector and the farmer that we depend on to produce the extra food that is needed face many risks. The poorer they are the more limited their ability to deal with these risks. Because the poor live on the edge of life, it does not take much for them to fall off. As mentioned earlier, unlike in the industrialized countries, falling off the edge in poor countries often has irreversible consequences.

The risk reduction strategies of the poor

Helping poor farmers reduce their risks is an effective way to reduce poverty because in spite of incredible effort and creativity on their part, the tools at their disposal are limited. Knowledgeable about climatic risks, for example, poor farmers will not only grow different crops but also grow them in different locations. They also often opt for stability in yields, and less risk thus limiting their income potential. Unfortunately their otherwise excellent strategies, often let them down because they are confined to certain localities, have limited purchasing power, and negative factors affect most of their options simultaneously. Drought, as we saw in the Horn of Africa and in Southern Africa affected

not only the crops they grew but also other agricultural activities in their locality such that employment opportunities which they depend on to diversify their source of income were reduced at the very time they need them most. Drought destroys both crops and livestock. In such adversity, each one affected tries to respond to the drought by selling off their assets – seeds, livestock, and roofing materials from their houses - to buy food. Their “terms of trade”, to borrow from the jargon of economists, deteriorates. Essentially, they compete against themselves not only in bad times but sadly also during good weather as all try to rebuild and restock at the same time and prices rise. Therefore, in good times as in bad, the risk response by the poor is often a costly one. Other factors such as poor infrastructure and lack of information also limit their options. Since the ability of the poor to respond to risks is limited, supplementing their risk-management efforts is a vital strategy to economic growth. What are some of the risks that we talk about? For convenience, while cognizant of their interrelatedness, we have, at IITA, categorized the risks producers and rural communities face, into biological, commercial, natural disasters, and political. I will touch on the first three because the root crops are an important weapon in addressing them.

Biological risks. These come in the form of viruses, fungi, bacteria, pests and weeds. This audience needs no elaboration on these sorts of risks. As an example, today, five or more Eastern African countries, including Tanzania, are suffering the effects of the cassava brown streak virus. These include Mozambique, Zambia, Kenya, and Malawi. National scientists in Mozambique and Tanzania report damage rates of over 50. We do not know much about this virus and while we research it, we can only implement containment plans. In the West and Central Africa, the combination of two virulent virus strains is threatening the very stability of large communities of Nigeria and the food security of several neighbouring countries. Taking

care of these biological risks is truly important. Not only are there severe social costs, but it also avoids substitution, which is in the long term not always for the best. The control of the Cassava Mosaic Virus in Uganda avoided the replacement of cassava by maize, which would have put the farmer in a more precarious position because maize is a far more risky crop for the poor. Controlling these risks pays huge dividends. The control of nematodes in yam has doubled profits and the biological control of cassava mealy bug has resulted in cost benefit ratios of 1:200.

Commercial risks. Perhaps least appreciated, commercial risks can be equally devastating and they come in many forms. As we encourage increased production in order to have cheap foods, we are also exposing the producers to price changes that can ruin them. The familiar price seesaw of high production low prices and vice versa is well known. Actually, we face more surplus problems in Africa than is recognized because they do not get the publicity that food shortages get, but to the producer who has to abandon a year's worth of work and investments it is devastating nonetheless. Today, Nigeria is struggling with its success story of producing enough cassava to cause a severe drop in price. We are working closely with the Government of Nigeria to turn this situation into an important development boost into commercialization. On the other hand, a starch factory near Mombasa - Kenya closed operations in 2001 due to insufficient raw materials and poor processing capacity. We see on the one hand the lack of market access, as being the bottleneck while on the other it is the lack of reliable supplies as the problem. Information and transport systems are not efficient. The accommodation of such commercial risks must be an integral component of the choices we make. Imagine if Nigerian surpluses could be moved economically to feed the capacity in Kenya to Zambia, which is putting out bids for cassava chips. Imagine if we found ways to transform more of these surpluses into high appeal products. One effective way to deal

with the seesaw, once subsistence production is reached, is to move the product into alternative uses. This path has the added advantage of less dependence on policies or a government's ability to intervene in the market. All these challenges have implications on the research you do.

Natural disasters. The cycle of drought that wreaks havoc in Southern Africa is fairly well defined and predictable. We can estimate when the next one will come. A wise person once observed, "**history teaches us nothing, but punishes for not learning its lessons**"

The horrific suffering that the population experienced in Southern Africa during the last drought can be greatly minimized by reducing the dependence on a few crops, barriers to commodity flows, and better infrastructure. The result of the over dependence on maize in Malawi and elsewhere, for example, need not occur and you can do a lot about it since root crops are less moisture sensitive. Farmers themselves are learning fast and correcting the situation. Studies show that as maize production is seen as unreliable, there are significant increases in production and consumption of cassava and sweet potato in Southern Africa in recent years. Production is expanding even in non-traditional growing areas and in cases, ninety percent of the farmers sold their cassava, implying that cassava has become an important cash crop in the region. For more than seventy percent of the farmers, food and cash were the major reasons for growing cassava and sweet potato.

Of the risks I outlined, farmers lump the biological natural disaster risks together and capture them in the word "harvest losses". This is their top concern. Non-biological risks and livestock losses drop to secondary and tertiary levels. These priorities of course vary country by country across SSA, but the aggregate pattern appears representative².

Summary

Root crops are important to our diets and to our poverty reduction efforts. There are

biological, commercial and natural disaster risks to be surmounted and we depend on you to continue directing your research to help the poor address them better. Only if such risks are addressed will our need to produce cheap food and enhance the commercialization phase succeed. IITA and its partners are trying to do their part by breeding increased productivity under similar producer conditions and struggling to provide early warnings to national governments about threats to our food source. Again, we rely on your work to provide the science to tackle such threats. So that the poor can benefit more directly from the full force of your science, we urge the deliberate selection of problem definitions and research methods that reduce risks, and create wealth. We urge the pursuit of research that could help reduce the need for expensive inputs and costly support programs. Bio-control is one example of such a science as are agronomic strategies to improve soils; control weeds and pests, but no doubt there are others. The bio-control programs on mangos and cassava, for example, avoid the need for chemical inputs and its accompanying health factors. For cassava, it even worked in countries that were at war and had dysfunctional governments. Combined with breeding and other national programs, it enabled production of cassava to increase threefold from 11 million tons to over 30 million tons in just ten years. We recognize that such approaches require a lot of research and some long-term commitments and we are trying to raise the awareness for stable financial instruments that could support your work.

To reduce the pain that arise out of natural disaster such as recurs in Southern Africa we are encouraging consumers and governments to broaden the food band to include other crops, in particular root crops but also more legumes, tree crops, fish and livestock. This will reduce their vulnerability and bring other benefits via improved health and reduced costs. To counter the commercial risks outlined earlier we need to double our search for alternative outlets for our products, to

reduce waste at times of plenty, and to construct SSA-wide information systems that will reduce market distortions that generally work against the producers. These thrusts may require that we direct more resources toward more basic research to deal with the biological threats, to increase shelf life, to reduce long growing seasons particularly for yams, and to rapidly enhance product development for root crops that are culturally sensitive. On the nutritional side, we can make progress through many channels, via education, better eating habits such as eating more greens, including cassava and sweet potato leaves, and simply not over cooking them. Over cooking not only denies our families healthier diets, but also uses more fuel. At the other extreme, we can biofortify or fortify them for direct consumption. We can also use root crops to improve human nutrition indirectly via contributing to more productive livestock sector.

A word of caution, we are humans. As humans, we all have our biases. In addition, if that was not enough, we have spent years piling on very strong professional or technical biases. It behoves us all, to avoid the temptation to propose solutions, commodities or techniques because we are familiar with them. To counter such temptations, it might help if we keep the poor we are trying to serve in mind at every step of the way and not let our professional blinders fog our judgment. Every point in our research where we have a choice lets opt of the one that will have the largest and, if possible, immediate impact on reducing poverty. Poverty remember, leads to bad outcomes.

Those of us who are not in the scientific realm, but have to deal with development challenges, are extremely proud of the work you have already done and look forward, with confidence, to even greater contributions from you. On behalf of all the poor all over the world that depend on roots and tubers, on a vibrant agriculture I thank you for your dedication and contributions.

THANK YOU.