

Horticulture

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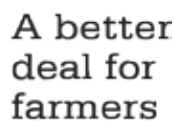
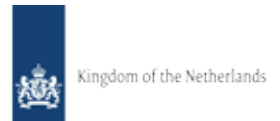
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OUR PARTNERS



We share Renalda's faith in the future for smallholders



After 23 years, Renalda Bernard Mlay decided to follow the passion from her youth and engaged in agribusiness as an entrepreneur. Renalda decided to grow red and yellow sweet peppers and bought quality seedlings from Rijk Zwaan. The transplanting went well and not a single plant was lost, but during the season she made some common beginner's mistakes. Crop advisors from Rijk Zwaan helped her on the spot with some basic tips about pruning and crop maintenance and advised to change the fertilizer regime. Soon the first harvest was ready and the cost of seedlings was recovered straight away after selling the first 150 kilograms. Furthermore, a substantial amount of money remained for new investments.

Renalda made a successful start as a smallholder in Tanzania and sees a lot of opportunities for the future. Rijk Zwaan shares this faith. Together with Renalda, we are working towards a healthy future. Learn more at rijkzwaan.com

Sharing a healthy future



MESSAGE FROM TAHA CEO & CHAIRPERSON TFHL



Welcome to our third issue of Horticulture in Tanzania Magazine.

I would like to take this opportunity to announce our successful closure of the Institutional Strengthening and Support to Horticultural Sector Program (ISSHSP), three and a half (3.5) years after its inception. The project was awarded to Tanzania Horticultural Association (TAHA) through a four-year Grant by the United States Agency for International Development (USAID) in December 2012 aiming at strengthening TAHA's institutional capacity to drive horticultural development in Tanzania and improve the quality and range of services that its members and other value chain actors receive. The program was part of the Feed the Future (FtF) initiative, a global hunger and food security program implemented by the US Government to Sustainably Reduce Global Poverty and Hunger.

We are happy to have implemented the program in eleven (11) regions in Tanzania Mainland (Arusha, Manyara, Kilimanjaro, Tanga, Kilimanjaro Water pumps, electricity installations, drip Pwani, Dar es Salaam, Morogoro, Dodoma, Iringa, Njombe and Mbeya) as well as in Unguja and Pemba. The program also addressed the key components of the value chains including improving business enabling environment where 26 policies were changed, technical support and training given to farmers where 28,210 beneficiaries were reached, exceeding target by 90%. As a result of the ISSHSP intervention, 57% of the total beneficiaries adopted and applied improved technologies, 5 Practical Training Centers (PTC's) were built and market linkage networks put in place

with 1,492 farmers linked to 148 identified buyers. This improved horticulture product value with every dollar invested generating 3.5 dollars at an improved pricing rate of 28 percent.

Other activities in this intervention included logistical support services, access to finance, assistance through the conduction of finance fairs and technical support services enhancement which saw 28,210 small scale farmers recording improved productivity, a number that highly surpassed the project's target of 8000 farmers by far. As a result of the ISSHSP project, the country's annual horticultural exports increased to USD 552 million dollars in 2015, rising from USD 374 million dollars in 2012 when the intervention started, an increase by 42%.

We would like to acknowledge all our partners with whom we worked and USAID without whose funding and support, the above achievements would not have been possible and for extending their funding to TAHA through the United States Department of Agriculture (USDA) for our new Horticultural Sector Transformation Initiative (HOSTI), a 3 year project that is part of the Feed the Future initiative which has also enabled the opening of the new industry facilitation hub office in Dar es Salaam for TAHA/TAHA FRESH.



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» p.8

From the editor

Welcome to our nutrition issue.

42 percent of pre school children are stunted and 69 percent suffering from iron deficiency, these are unfortunate statistics. In this issue we are highlighting the importance of essential nutrition. From our features on home gardens to the modern technologies of urban farming for both small and big households.



We are also joining the healthy living lifestyle trend that promotes healthy eating habits. There is a big challenge, with numbers of obesity increasing around Tanzania and malnutrition in infants and adults still prevalent. The Scaling Up Nutrition (SUN) Business Network is engaging private sector businesses on nutrition and brainstorming ways in which they can contribute towards the achievement of national nutrition goals in Tanzania.

Whereas, the horticulture industry has made great growth leaps in recent years, its major missing link for product exportation from Tanzania remains the quality of packaging. An initiative between TAHA and FFD highlights the gap as an investment opportunity that could be exploited. More stories on money matters and financing are also featuring.

African urban areas are estimated to attract over 50 percent of national populations by 2030, UN Habitat report 2007; the question is, how can we best utilize the limited space we have to produce food? Urban farming techniques and green house farming are some ways in which this question is being answered in Tanzania. The latter - greenhouse farming, has become so popular and we share with you a success story of self-belief and following your dreams of a phenomenal woman, Ms. Pamela, who after 15 years left the security of her desk job as a flight operations manager and joined greenhouse farming.

Her story inspired us, we hope it inspires you.

SANDRA KABONGOYI, Managing Editor
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VEGETABLE HOMEGARDENS IN TANZANIA:

The obvious way to combat malnutrition and raise healthy children



In Tanzania, 42 % of pre-school age children are stunted and 69 % suffer from iron deficiency (anemia)

By Dr. Ralph Roothaert

World Vegetable Center, Arusha

Micronutrient deficiency in children is often referred to as 'hidden hunger'—children look

healthy, but at the same time they are stunted and underweight. This type of malnutrition has serious implications; children malnourished at a young age may never reach their full potential when mature, and their cognitive skills may be permanently impaired. In Tanzania, 42 % of pre-school age children are

stunted and 69 % suffer from iron deficiency (anemia). Often these conditions are coupled with deficiencies of other micronutrients such as vitamin A, iodine, calcium and zinc. Children living in rural areas are 1.4 times more likely to be stunted than children living in urban areas and a child in the poorest household is 1.8 times as likely to be stunted as a child in the richest household. There are several ways to tackle micronutrient deficiencies: supplementation with pills or powders, addition of minerals and vitamins in common foods such as cooking oil and flour, or breeding crops that are rich in a certain vitamin or mineral. Unfortunately, these methods are costly, focus only on single nutrients, and are costly for families already struggling to make ends meet. The World Vegetable Center has opted for a totally different strategy to tackle this problem: encouraging households to grow nutrient-dense vegetables in their own homegardens. Homegardens offer several advantages: they

are cheap to set up and maintain, most rural households are already familiar with growing vegetables, and people can save seeds from the plants and repeat the production cycle for many years, providing a constant supply of vegetables at little extra cost.

The Center's Arusha office has a seed bank with more than 2,300 different specimens of vegetables, most of which are traditional African vegetables. Some commonly consumed traditional vegetables in Tanzania are amaranth (mchicha), nightshade (mnavu), Ethiopian mustard (loshuu), spider plant (mgagani), jute mallow (mlenda) and cowpea leaves (kunde). These vegetables have one thing in common: they are all very rich in micronutrients, much more so than global vegetables such as cabbage and tomato. Table 1 clarifies this contrast; it shows the recommended daily nutrient intake for a pregnant women in the beginning of pregnancy (first trimester). Staples such as

Homegardens offer several advantages: they are cheap to set up and maintain, most rural households are already familiar with growing vegetables, and people can save seeds from the plants and repeat the production... cycle for many years...

Table 1: Recommended nutrient intake (RNI) and percentage RNI provided by 100 g of food item.

	Protein	Vitamin A	Iron	Folate	Zinc	Calcium	Vitamin E
	g	µg RE	mg	µg	mg	mg	mg α-TE
RNI for pregnant women (1 st trimester)	60	800	30	600	11	1000	7.5
Percentage of RNI	----- % -----						
Rice	6	0	1	2	4	0	0
Cassava (root)	2	0	1	5	3	2	0
Millet	6	0	2	14	8	0	0
Meat (chicken)	37	0	3	1	14	1	3
Cabbage	3	1	1	10	2	4	2
Tomato	2	18	1	3	2	1	7
Moringa leaves	7	146	11	49	5	10	65
Amaranth	9	160	6	31	6	32	17
Jute mallow	10	198	12	21	0	36	36
Nightshade	8	101	13	10	9	21	28
Vegetable cowpea leaves	8	193	6	27	3	54	101



rice, cassava and millet provide less than 14 % of the required amount of micronutrients in a 100-gram portion. Chicken meat provides good amounts of protein but very few other nutrients. Tomato and cabbage provide very small amounts of micronutrients. However, traditional vegetables such as moringa, amaranth, jute mallow, nightshade and cowpea leaves have very high concentrations of vitamins and minerals, and in the case of vitamin A, provide almost twice the amount required in a 100-gram portion.

In collaboration with HORTI-Tengeru, Farm Concern International, and the District Councils, the Center's Homegardening Scaling Project in Tanzania, funded by the United States Agency for International Development, is mounting a strong effort to combat malnutrition and promote the consumption of nutrient dense vegetables. The project targets women of reproductive age and young children in rural areas that are most affected by malnutrition: Babati and Kiteto Districts, and Unguja Island,

Zanzibar. The approach has four elements: increasing awareness of the importance of vegetable consumption, training in good agronomic practices, distribution of vegetable seed kits, and improving vegetable cooking and processing methods.

Increasing awareness

The World Health Organization recommends consumption of at least 400 grams of fresh vegetables and fruit per day per person. Consumption in East Africa is much lower, at only 59 g of fresh vegetables and 151 g of fresh fruits per day—about half the required amount. These are averages, and in the severely malnourished regions of Tanzania, the amounts might be even lower. There is a clear need to alert consumers and encourage them to change their behavior towards higher intake of vegetables. Most rural households already consume traditional vegetables, but only about 33 grams per day on average. Awareness creation consists of several aspects: first of all, people need to

be alerted to dangers and effects of malnutrition, particularly regarding the physical development and health of their children. Secondly, people need to become aware of the nutritional benefits they will realize after choosing to consume traditional vegetables. And finally, people need to understand the importance of following good hygienic standards while preparing and eating food, as well as ensuring general good health of children, because sick people cannot sufficiently absorb nutrients from food. All this knowledge increases demand for vegetables in the household, which can best be supplied by training people how to grow traditional and other vegetables in their homegardens.

Training of trainers

The project aims to train more than 6000 households in improved seed handling, nursery practices, transplanting, proper spacing, soil and water management, pest and disease management, harvesting techniques, postharvest technologies,



Women farmers sort through seed kits provided by World Veg Center, Arusha

and marketing. To create a snowball effect by training, the project trains innovative and dynamic women and men farmers in the villages who are willing to volunteer to train other farmers. These trainers receive a bicycle to facilitate their movement around the villages and advise others on homegarden practices. Field officers and experts assist the trainers in establishing demonstration gardens where the best agronomic practices and best varieties are displayed, and where farmer groups come together regularly to learn about the various stages in vegetable production. Located in prominent places, the demo gardens attract the attention and curiosity of passers-by.

Vegetable seed kits

After farmers finish their first training session in their villages, they are better informed about how to establish a good and productive homegarden. The World Vegetable Center provides each household with a vegetable seed kit containing small amounts of seeds of a range of different traditional vegetables: amaranth (two varieties), African eggplant, okra, nightshade, spider plant, jute mallow and cowpea. Sometimes global vegetable seeds are included if requested specifically; in Zanzibar, for example, tomato is a cash crop and so tomato seed was included in the kit to help household gardeners generate income. The varieties are evaluated using several criteria: taste, yield, pest and disease resistance, drought resistance, market price, and general ease of growing. The evaluation results help us select appropriate crops. For instance, amaranth 'Madiira-2' (*A. cruentus*) is preferred for its taste, but amaranth 'Ex-Zanzibar' (*A. dubius*) is rated higher for drought resistance. The seed kits contain enough seeds to enable an average sized household to grow enough vegetables for home consumption throughout the year. The recommended size for a homegarden is 6 m x 6 m. The Center also collaborates with seed companies such as East African Seed, Kibo Seed Company and East West Seed to gradually take over the production and distribution of the seed kits. Commercial seed companies are better equipped to produce large quantities of seed kits than the Center, and involving the private sector will help to sustain the initiative over the long term.

Cooking tasty and healthy dishes

Farmers in the villages learn how to differentiate between

good and bad cooking practices. For instance, boiling vegetables for more than 5 minutes breaks down nutrients, and the practice of draining excess cooking water removes most of the nutrients. The best way to learn how to cook in a different way is by doing it! Cooking activities and shows are the most enjoyable part of the training course. Women with innovative and healthy recipes for cooking vegetables, based on locally available ingredients, are invited to demonstrate their skills and share with others. Some World Vegetable Center varieties such as African eggplant ('DB3') or nightshade ('Nduruma') are less bitter than the types found in the wild—an advantage when feeding children, who usually don't like bitter flavors, and may consume more vegetables if the taste is sweet.

And what about making or saving money?

The majority of households with homegardens in Tanzania not only consumes vegetables, but also sell a significant portion of their harvest. Sometimes traders buy vegetables at farm gate, sometimes farmers go and sell to traders, or farmers retail by themselves—and women actively participate in these lucrative marketing activities. Money generated by women is in good hands, as they will more often invest the money in the maintenance and general wellbeing of the entire household. There is a trade-off between consumption and marketing of vegetables; however, it is the individual farmers' decision whether to sell their vegetables and how much to sell. With increased awareness of the nutritional benefits of vegetables, the focus is expected to shift towards consumption. A recent study by the World Vegetable Center showed that many households buy other vegetables to increase diversity in their meals. Economics also plays a role in other aspects of vegetable consumption, as illustrated by Manaida Saidi, a grandmother in Kiteto District taking care of a large family: "I usually buy water to irrigate my homegarden. I use 5 buckets of water in the morning and 5 buckets in the evening. I pay Tsh 100 per bucket, so that is Tsh 1000 per day. It might seem much, but if I don't irrigate, I have no vegetables to eat. I would have to spend more than Tsh 1000 to buy them from elsewhere to feed my family. I am proud that I can provide my grandchildren with vegetables every day."

The SUN Business Network (SBN) is a global movement convened by the UN World Food Programme and the Global Alliance for Improved Nutrition (GAIN). The SUN Business Network in Tanzania is part of SUN Movement, coordinated by the Government of Tanzania through the **Prime Minister's Office**.

SBN which aims to raise awareness about nutrition and to grow the market for nutritious foods in Tanzania. Through this, we are contributing to our national nutrition goals.

Today on nane nane, we recognise the following organisations who have committed to improving nutrition in Tanzania by becoming members of the SUN Business Network:



Does your organisation...

Want to improve nutrition in Tanzania?

Recognise the commercial potential of nutrition in Tanzania?

Want to help grow the market for nutritious foods and increase demand?

Want to see a more nutrition & health focused workforce for improved productivity?

Join the SUN Business Network today!

The importance of engaging with Business on nutrition

SBN mobilises the private sector by engaging them to contribute towards the achievement of national nutrition goals. In Tanzania, there are four main reasons for engaging with the private sector on nutrition:

All sectors must play a role



- The SUN Movement will have the most impact by combining resources and capabilities across multiple sectors, and ensuring these efforts are effectively coordinated
- Businesses can complement the government's nutrition agenda by supporting in areas where other stakeholders may not have the same reach or potential impact on a large consumer group

Business is important for nutrition



- The open market is where most people access most of the products and services to meet their foods and dietary needs, including the 4.5 billion Base of Pyramid (BoP) consumers
- The private sector can be the source of many of the innovations in new products and technology, financing mechanisms and distribution models that are needed to scale up nutrition sustainably
- It has been acknowledged in Tanzania's National Nutrition Strategy that "While the driving force of the private sector is to make profit, with renewed commitment to the improvement of the well being of Tanzanians, this sector has a strategic role to play"

Nutrition is important for business



- Nutrition offers opportunities to develop new markets to increase sales and profits
- Good nutrition in the workforce leads to reduced sick days and accidents, and improved productivity. It is estimated that USD\$18bn in economic productivity will be lost as a result of stunting in Tanzania by 2025 if there is no improvement!
- Being socially responsible can enhance a business' corporate reputation

Business has a comparative advantage



- The private sector can offer different nutrition capabilities than the public sector. Including:
- Generating demand for nutritious products and services
 - Focusing on scale, efficiency and cost effectiveness
 - Focusing on innovation & product development, which can make nutritious food more affordable and desirable
 - The ability to embed quality management and food safety systems along the food value chain

The high level multi sectoral meeting identified the following priorities for SBN: Consumer awareness creation, Agriculture & Nutrition linkages and Fortification improvement. With regard to improvement of nutrition outcomes from agricultural investments, SBN is pursuing the following strategic objectives:

- Identifying and stimulating nutrition opportunities along the various agricultural value chains
- Raising awareness & creating demand for nutritious agricultural products
- Establishing work force nutrition programmes
- Reducing post-harvest commodity and nutrition losses



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TAHA'S & FFD'S PACKAGING INITIATIVE FOR TANZANIA

Tanzania Horticulture Association (TAHA) together with Finnish Agri-agency for Food and Forest Development (FFD) have started an initiative advocating for an effective packaging industry in Tanzania. Agricultural value chains are becoming more streamlined in Tanzania and the percentage of sales through supermarket chains is increasing, as is volume of export. Tanzania's horticulture industry offers a possibility to diversify external revenues for the country as well as become an important sector to provide jobs for the growing population. The more the production grows and is exported, the more there is a need to invest in proper packaging and labelling.

There are some companies manufacturing cardboard boxes in Tanzania but most of the packaging material comes from Kenya. The horticultural sub-sector in Tanzania

has a contributing potential to the agricultural sector and the economy in its broad sense. Addressing challenges facing the key players in the horticultural value chain would increase the contribution of the sector to the Gross Domestic Product (GDP). As of recent, the horticultural sub-sector contributes to the agricultural sector about 0.6 billion USD in 2015 (from 0.4 billion USD in 2014) which is almost half of what the whole agricultural sector contributes to the economy (USD1.2 billion), (TAHA, 2016). Horticulture in Tanzania has also shown steady growth as the value of exports has been increasing in past five years 2010 - 2015 for example in 2013 export were 375 million USD and increased to 545 million USD in 2015.

With the horticultural industry in Tanzania as one of the leading consumers of packaging materials in the country whereby Tanzania

horticulture comprising of over 70 different crops in various forms including fresh, processed, dried etc. there is an urgent need to enhance access to packaging materials.

THE UNTAPPED POTENTIAL

Tanzania's food, fresh fruit and vegetables and spices packaging industry derives its strength from the large volume of agricultural production, the steady growth in food commodities and the continually increasing food demand fuelled by

rising incomes. Industry limitations that beset the packaging material sector across the country include limited packaging solutions to meet international market requirements, and the small size of the domestic demand for packaging materials that consequently leads to low investment by the packaging industry. This, in turn, limits country's ability to enhance product quality to meet standards of increasingly discriminating consumers, both in domestic and international markets.

With increasing globalization where competition with foreign competitors are occurring even on home grounds or local traditional markets, the packaging challenges for sector are likewise enhanced.

This problem can be viewed instead as an opportunity in terms of an untapped potential for the packaging sector to cater to. The key is to know what the market requirements are and which packaging solutions will meet them at best level.



As most of the agricultural products exported to International markets are already processed at point of origin, the demand for these to be properly packaged in retail friendly form is on the rise and this is an opportunity for Tanzania to take advantage of. It appears greatest potential to develop package manufacturing in the country, given the tendency to process nearer to the production source and the availability of paper and paperboard packaging materials.

As to packaging machinery, creativity in coming up with locally designed equipment suited to local needs and conditions will help propel packaging industry growth and development

Initiatives towards growth of packaging industries in the country may come either from improving traditional technologies or importing new ones. However, more relevant than the appropriateness and balance of the selected mix of strategies, the success of these initiatives will be contingent on a country's enabling environment, both economic and political. As packaging materials are in short supply in the nation, softening packaging regulations without sacrificing safety considerations may assist the industry to develop.

Developing the packaging service provision subsector, specifically pre-packing of food products for export, and outsourcing the packaging of food, fresh fruit and vegetables products to specialized companies, will provide a much-needed boost to the packaging industry in developing countries. They will not only lend affordable packages and packing but will likewise enhance handling and distribution efficiencies to exporters, specifically to SMEs.

Tanzania has to improve quality, better packaging and labeling as well as high

performance in terms of consistency and reliability of supply to win a spot in the export market however this has been constrained mainly by procedures/regulations which are cumbersome and often frustrate potential investors including those in packaging industry.

Types of Packaging materials used in horticulture

Due to the nature of horticultural industry, the industry requires an array of types of the packaging materials serving the varying purposes. The horticultural products vary from fresh commodities, and dry products.

At present the demand for packaging material is hardly being met by the existing infrastructure. Farmers have limited access to packaging materials as a result of which; productivity and quality of the produce suffers.

Plastic: This happens to be the most used form of packaging due to its wide availability compared to other types of packaging. Most of these plastics are being produced by industries in Tanzania but almost all the raw materials used are imported from other countries. This has a significant contribution to the price of plastic material. Horticultural producers import plastic packaging materials used for export of perishable horticultural products, and spices, mainly from India, Kenya and the Middle East. Plastic is commonly used as a packaging material because it can be manufactured into almost any shape. It is lightweight, moisture resistant, strong and durable.

Most plastic used is recyclable depending on the existing infrastructure although the process can be difficult for the bulky ones. Plastics

are either rigid or flexible and there are a number of different types for a wide variety of applications. Horticultural use of rigid plastic in form of; delivery plastic crates which provide excellent protection for produce and adequate ventilation in handling, transportation and storage; plant pots mostly used for cut flowers; trays, bottles and pouches. Negative side with plastic is that there are more and more countries which want to limit the use of plastic due to its negative impact on environment. There are only few available plastic forms which are biodegradable and thus it remains in the nature as waste.

Plastic crates: These are used mostly by fruits producers, and are preferred



due to their ability to withstand rough roads when fruits are being transported to their destinations (or from production sites to their packaging sites for export). These crates also have an advantage as they are re-usable for a number of times. Their prices have been generally considered to be fair, ranging around 4 500 TSH to 5 000 TSH in Dar es Salaam. Analysis shows that many companies engage in the production of plastic crates, with other share of crates being imported and sold in the domestic markets by retailers. The demand for these products is growing while the domestic supply (production) is static. Most of these products are imported.

Factors that requires attention when using plastic crates are related to phytosanitary aspects.

If the plastic crates are disinfected properly before recycling that can become vectors of pests and diseases. The dispersion of Tuta Absoluta is an infamous case of a pest which has been transmitted through used plastic crates.

Corrugated: The second most used material is corrugated boxes which are produced locally and some are imported from neighbouring countries like Kenya and also from South Africa due to high prices in the local market. Corrugated boxes are produced by quite few industries in the country in comparison to plastic packaging companies. Corrugated (often called simply cardboard) consists of paperboard liners separated by a fluted medium. Liners are typically



made of kraft paper, (kraft means “strong,” resulting from long conifer cellulose fibers - which are not smashed, as is the case with paper, to make a smoother surface). Good quality fluted medium sheets are made from semi-chemical hardwood pulp, which gives good flattening/compressive strength for the sheets.

Good quality corrugated boxes are not available in Tanzania but are imported mainly from Kenya. At the global level there is more emphasis on corrugated boxes which are designed according to the specifications of clients. New corrugated materials are replacing fast plastic since they are biodegradable.

Glass: This is available in several colours commonly brown, green and clear. The drawbacks of glass packaging are that it is relatively heavy meaning that it can be comparatively expensive to transport and it can be easy to break if it is not protected by other packaging in transit. The advantage of using glass is that it can easily be recycled. A large percentage of most glass comes from recycled sources. However, there is just one industry in Tanzania dealing with the production of glass i.e. Kioo LTD, and it doesn’t produce the type of packaging the horticultural sector demands. This in turn forces the horticultural farmers to import glass from countries like South Africa. Glass brings added value to products particularly in the retail environment. It is typically used for bottles and jars and quite expensive in price, so if the Government could reduce import duties on such inputs,

the cost of production would be lowered.

Sacks and Net Bags: They are flexible containers and are generally made of woven jute fibre or woven synthetic material such as polypropylene. Sacks are generally used for transporting horticultural products to the wholesale markets. Plastic sacks are extensively used for packing onions, potatoes, garlic, lemons and oranges. Net bags are generally colourful and are made of open mesh using polypropylene relatively cheap and are best suited for relatively physically hard products like apples, onions, lemons and garlic.

Wood and “Tengas”: These are perhaps the most used packaging in the domestic informal market and the most available material in Tanzania due to the presence of a developed forestry industry. Wood makes strong, durable and natural packaging. It is a fairly a rigid material which restricts its use especially in fresh horticultural products like tomatoes, mangoes and other vegetables. Wood is quite rough and causes bruising to the products before they reach the market. The same applies to “tengas” which easily transmit decay because the products are poorly ventilated. Packaging from wood and tengas are commonly reused. Wood and tenga packaging have been largely replaced in most applications in formal markets due to its unattractive appearance, but it is still commonly used. Wood and tengas are biodegradable but they produce a lot of waste which needs to be disposed of. This can become a problem in city-areas where accumulated waste needs to be transported away.

Conclusion

The packaging industry in Tanzania is comprised of very few industries in comparison to the respective demand of the packaging materials in the country. The existing industries are commonly located in rural areas of Tanzania which is an additional inconveniencing cost to procure for procuring their products. With a high demand from horticultural exporters, there is an impeding need for investing in an effective packaging system through the development of a constructive action plan. The TAHA/FFD initiative hopes to achieve just that through promoting innovative technologies, promotion of new investments in the packaging sector and engaging the Government to create regulatory and policy frameworks which are supportive to the packaging sector and provide a competitive and reliable packaging solution for the horticulture industry.

PATA TAARIFA ZA MASOKO YA MBOGA, MATUNDA NA VIUNGO KWENYE SIMU YAKO POPOTE ULIPO!!



*Kujiunga, tuma
meseji yenye neno
TAHA kwenda
namba **15670**,
kisha fuata maelekezo*

MAZAO YANAYOPATIKANA

*Nyanya, Hoho njano na
nyekundu, Hoho kijani,
Kabichi, Karoti, Kitunguu
maji, Kitunguu saumu,
Viazi mviringo, Tango,
Tangawizi, Ndizi, Nanasi,
Tikiti maji, Embe, Pesheni,
n.k*

*Kwa mawasiliano zaidi piga
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Doing business, let's make it easy - and fair



BEST-Dialogue (formerly BEST-AC) is a grant making Fund that supports sustainable private sector growth in Tanzania. The project reaches out to a wide range of Tanzanian membership organizations such as TAHA, representing businesses from agriculture, manufacturing, construction and infrastructure, the hospitality and tourism sectors, the large informal micro-business sector as well as the creative industries.

The support is provided through training and mentoring, by expanding networking opportunities, in effective communications and media strategies, and notably through grants that enable the organizations to commission research that will help identify and detail solutions to barriers in doing business.

By using well-researched evidence, the organized private helps the government in how best to improve the business environment and the investment climate for equitable economic growth, in the facilitation of entrepreneurship and the creation of employment opportunities.

BEST-Dialogue has entered into partnership with TAHA since 2007 with the aim to improve the business environment in the horticultural industry. TAHA is a prominent association and has made resounding contributions in the development and transformation of the horticultural sub-sector by its research about issues and by entering effectively into dialogue with government. Due to this support, TAHA has managed to address over 30 different policy proposals some of which were successfully attained. Below are some of the projects that have been supported by BEST-Dialogue;

- In 2012, TAHA presented a white paper on desired horticultural incentives, urging the government to consider more favorable policies and procedures to make doing business easier in the industry. This included reviewing the agricultural taxes (VAT exemption and import levies) for equipments and inputs.
- TAHA advocated for a more efficiently managed fertilizer and pesticide registration process as well as improved importation schemes to better facilitate access and use of modern inputs by local farmers. With the ongoing consultative meetings between TAHA members and the Ministry of Agriculture, the government is underway to review the fertilizers act and regulations, as well as for pesticides.
- TAHA lobbied for efficient and effective systems in horticulture bonded warehouse schemes. The challenges faced by the horticultural companies when importing materials or exporting to international markets included long delays at the borders caused for instance by confusion about eligibility for tax exemptions. TAHA worked on a proposal to improve the TRA bonded warehouse schemes. As a result horticultural companies can now register and benefit from incentives such as for bulk importation of packaging materials
- Standards and compliance in horticultural industry have a significant impact in the development of the sector TAHA is working tirelessly to ensure systems of standards are centralized and harmonized. Aim is the establishment of guidelines for horticultural producers in the protection of public safety and the management of food trade in accordance with international market requirements.
- TAHA aimed at more attention for the horticulture subsector in District Agricultural Development Plans (DADPs), notably to spotlight the significance and prioritization of horticultural activities in the district planning and budgeting. After a series of dialogues with the government there has been an increase in DADPs budget allocation for horticultural interventions in a first group of eight districts. TAHA is now actively and successfully involved in government's national plans and budget in matters relating to horticulture.



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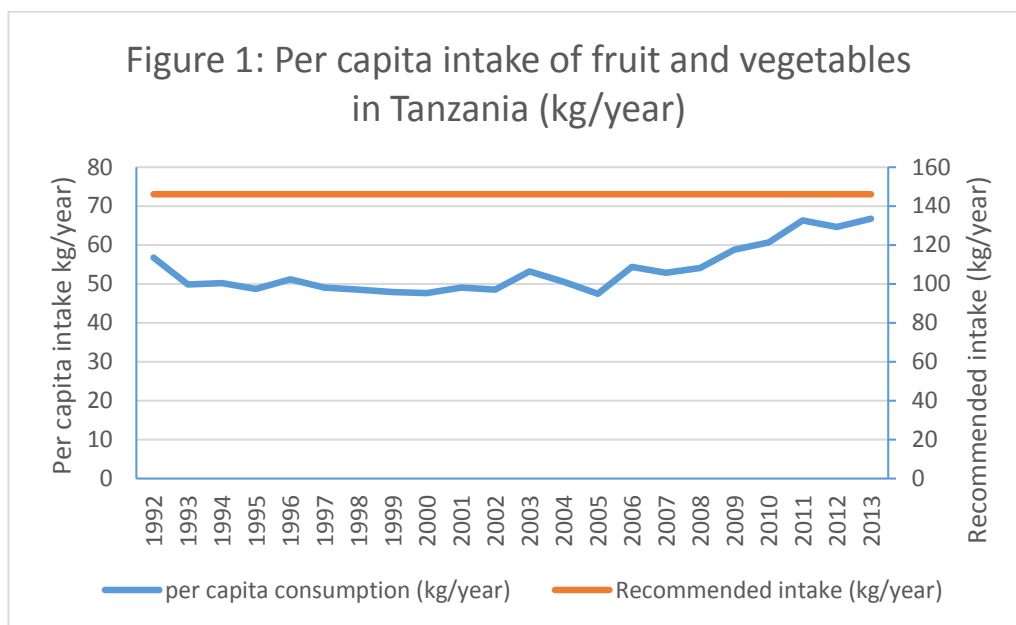
Demand for horticultural crops in Tanzania is growing dramatically

By Ephraim Nkonya

International Food Policy Research Institute, Washington DC

Introduction

Fruits and vegetables are rich sources of vitamins, minerals and fiber and their intake significantly increases health and vitality. It is estimated that 5.2 million people died in 2013 due to low intake of fruit and vegetables in the world ([WHO 2016](#)). The World Health Organization (WHO) ranks low fruit and vegetable intake as the sixth leading cause of death worldwide.¹ The mortality rate due to low fruit and vegetable intake in sub-Saharan Africa is higher since the region has the lowest per capita intake of fruit and vegetables. For example average per capita annual consumption of fruit and vegetables in Tanzania in the past 10 years was only 56 kg, a level which is only 40% of the WHO recommended adult intake of 146 kg/per year (Figure 1).



Sources: Intake: FAO statistics; Recommended intake, WHO

<http://www.who.int/mediacentre/factsheets/fs394/en/>

The good news is, intake of fruit and vegetables is increasing (Figure 1), a pattern consistent with global upward trends of consumption of healthier foods as income and urbanization increase. In the past decade, fruit and vegetable intake increased by 15% compared to its average in 1992-2002 (Figure 1). The urban population accounts for the largest share of the increasing fruit and vegetable consumption.

¹

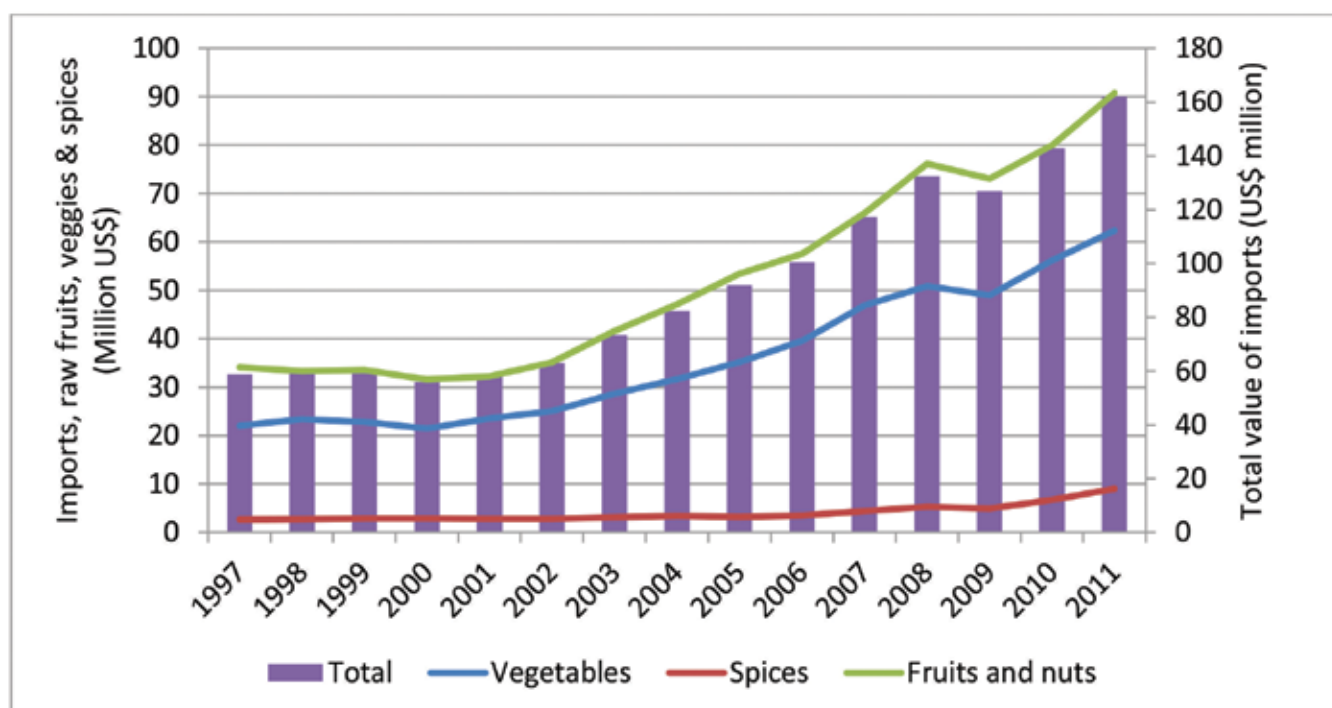
Ruel M., N. Minot and L. Smith. 2005. Patterns and determinants of fruit and vegetable consumption in sub-Saharan Africa: a multicountry comparison. Background paper for the Joint FAO/WHO Workshop on Fruit and Vegetables for Health, 1-3 September 2004, Kobe, Japan.

The increase in fruit and vegetables intake in rural population, which accounts for 80% of the 12 million poor and extreme poor (World Bank, 2015)² – remains negligible.

How is the Tanzanian market responding to increasing demand for fruit & vegetables?

The market has responded to the increasing intake of fruit and vegetables by increasing supply of high quality and well-packaged fresh fruit and vegetables. Accordingly, the number of supermarkets in the country have been increasing fast in the last two decades (Minten and Reardon 2008).³ The major challenges the smallholder farmers face in conducting business with supermarkets and grocery stores is the small quantities they produce and the higher quality standards required, which smallholder farmers fail to comply with. Consequently, the supermarkets and big hotels have resorted to importation of fresh fruits and vegetables. As shown in Figure 2, importation of fresh fruit and vegetables have been increasing fast since 1997.

Figure 2: Value of Fresh fruit and vegetables importation in Tanzania



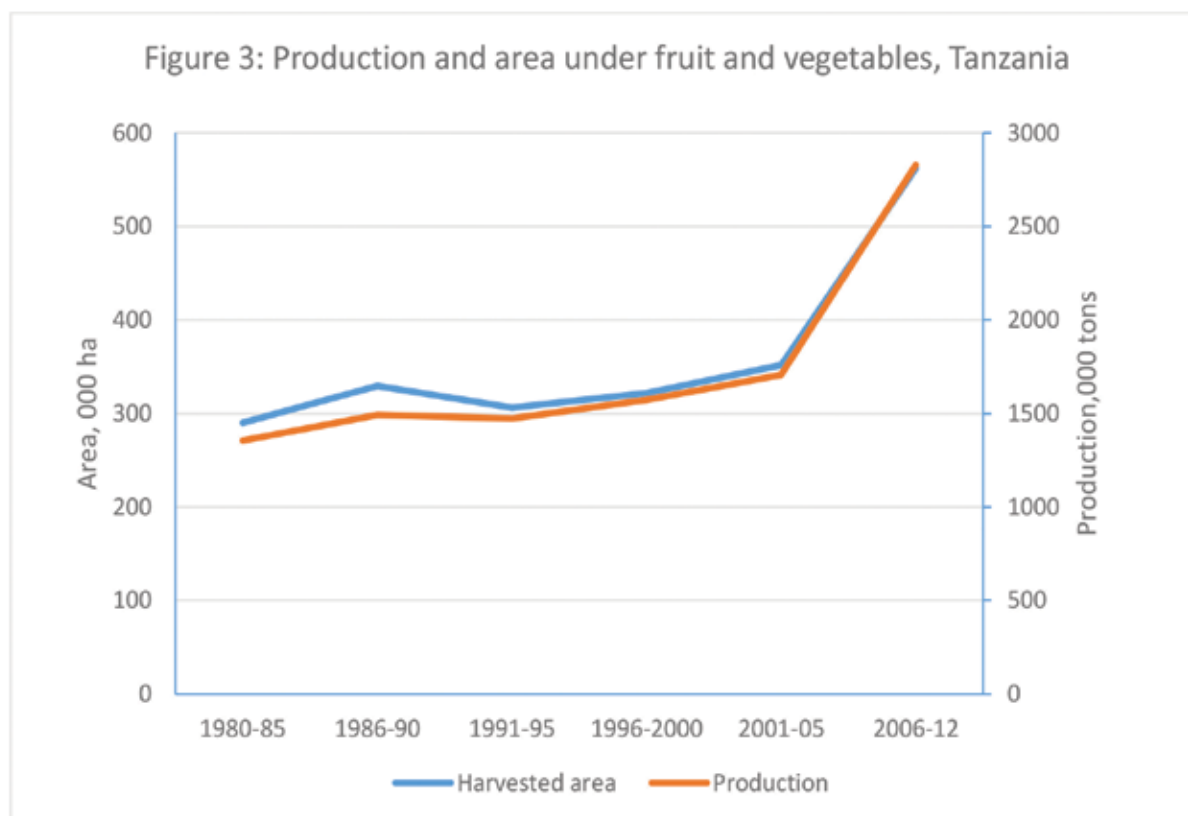
Source: UNCTAD data

On the production side, the farmers have also been increasing production of fruit and vegetables. The area under fresh fruit and vegetables increased by about 83% in 2005-12 compared to its average

² World Bank. 2015. Tanzania Mainland Poverty Assessment. Online at <http://www.worldbank.org/content/dam/Worldbank/document/Africa/Tanzania/Report/tanzania-poverty-assessment-05.2015.pdf>

³ Minten, B., & Reardon, T. (2008). Food prices, quality, and quality's pricing in supermarkets versus traditional markets in developing countries. *Applied Economic Perspectives and Policy*, 30(3), 480-490.

in1990-95. In comparison, cropland increased by about only 50% from about 10 million hectares in 1991-96 to about 16 million hectares in 2006-12 (Figure 3).



Sources: FAOSTAT raw data

What could be done to exploit the opportunities and address the challenges of smallscale horticultural farmers?

The increasing demand for fruit and vegetables in Tanzania, which is arising from increasing income and urbanization provide big opportunities for improving rural and urban health of consumers and increasing household income of producers. The challenges are the diseconomies of scale of smallholder who cannot provide the large quantities and high quality and well-packaged produce required by the high-end supermarkets and hotels. The high perishability of fruit and vegetables also is a big challenge that needs to be addressed by well-organized farmer groups and storage and transportation facilities. It is time to revive the old cooperative marketing arrangement that provided efficient rural services to support export crop production, processing and transportation services in the 1940s to 1980s. Group production and marketing could address the diseconomies of scale that farmers face. Collective marketing could also increase the farmers bargaining skills and allow them to capture the prime markets. This is where TAHA could provide a leading role in helping farmers to capture the prime markets, who offer much greater prices than roadside or open marketing points.



Its time

TO GET SERIOUS ABOUT URBAN FARMING

Louise Labuschagne, Director Real IPM Tanzania, explains how urban farming can contribute to nutrition and livelihood security.

There is a vested interest in making sure that urban poor have space to produce food in an environmentally safe way, without extensive use of premium land...

The UN Habitat report (2007) predicts that by 2030 the urban areas in most Sub-Saharan Africa will have attracted over 50 percent of national populations. Even if this is an over estimate, these concerning trends are exercising the minds of urban planners who are responsible for managing the mayhem that could ensue. More people need more space. Space is finite. Where will it all happen?

Not all these people will have jobs or food security and this will have an effect on the social dynamics in urban areas. Hungry people behave less predictably and are less able to contribute to the economy. Apart from the humanitarian responsibilities of civilized societies to cater for all members of society, there is a vested interest in making sure that urban poor have space to produce food in an environmentally safe way, without extensive use of premium land.

Vertical bag farming, integrated with rainwater harvesting, drip irrigation and composting, is likely to provide some of the solutions to this ever-increasing problem. Real IPM Tanzania is setting up an urban horticulture demonstration farm at the World Vegetable Centre in Arusha to demonstrate these technologies. www.avrdc.org Real IPM Tanzania will be running new training courses at this centre in 2017. www.realipm.com

Modern Urban diets

It's not just the urban poor who benefit from home produced food. A diet consisting of fresh, clean, pesticide-free vegetables provides the foundation of a balanced diet and healthy families. Obesity and diabetes are the modern plagues that threaten to undermine the health of families and populations of workers that contribute to national economies. We need to eat more fresh vegetables and less chips and fried chicken. We need to exercise more. Urban Farming is productive exercise that produces healthy bodies and healthy diets. Perhaps, it the new gym?

Opportunities for Urban Farming

There are many middle and upper-class homes in urban centres, who can afford to employ staff to set up kitchen gardens with bag farms and drip irrigation systems in their own home gardens. This would even provide excess food to ensure their staff had access to fresh vegetables and better health.

Bag farms come in all sizes. Small bags on drip trays can turn a small balcony in a high-rise block – into a mini farm. Because the vertical bag farms are filled with compost they do not have to be on what is considered conventional farmland. The compost-filled vertical bags can even be situated in a car park or rocky land. Industrial commercial companies could also

produce healthy food from drip irrigated bag farms, around the edge of their car park, using rainwater harvested from the roof of the factory. Prisons, hospitals, schools and orphanages are some of the Institutes that are likely to have waste materials to compost, space, staff and roof space that are the ingredients for Urban Farming.

It's time to get serious about Urban Farming.

Bag Farm Technology

Real IPM Tanzania is piloting bag gardens made from materials with UV light inhibitor so that the bags have a life of up to 10 years and can be continuously replanted. Most other bags disintegrate within a few weeks when exposed to strong sunlight. The large bags can accommodate up to 100 plants that are inserted into holes around the outside of the bag. The large bag occupies about one meter square of soil and needs an additional 2-meter square of land to allow space for the leaves to expand and access for harvesting and spraying.

The total area needed per large bag is therefore 3 meter square. The increase in productivity per meter square of land is at least 600% because normally only 5 sukuma plants would be planted per meter square. So in 3-meter square there are now 100 plants instead of 15 sukuma plants. The level, exposed soil at the top of the bag can still be planted with crop such as carrots, onions, leeks, beetroot and tomatoes. This increases the productivity per meter-square even higher. It's a no brainer.

Drip kits have been designed to deliver water directly to the top of the bag and efficiently deliver sufficient water even to the plants in the lower sections of the bags. There is no evaporation of

water from the soil surface because it is no longer exposed as the bag material covers it.

Crops such as sukuma wiki, spinach, amaranth, spider plant, nightshade and coriander are nutritious leafy vegetables that are well suited to this growing method because the householder or commercial farmer can continuously harvest leaves and the crop will re-grow. Sukuma wiki often lasts for 12 to 18 months in bag farms, whilst spinach can be harvested continuously over more than six months.

Pastoralists have also used these bags for producing continuously harvested animal fodders such as lucerne and sweet potato leaves.



This system fits very well with zero grazed animals in urban areas – especially if the manure is composted and used to fill the bags. The bonus is that even the leafy sweet potato varieties can also produce tubers for consumption. Mixing the two types of sweet potato (one that is very leafy with one that produces a lot of tubers) can be a very productive system.

We cannot afford to ignore the benefits of bag farming for urban dwellers and rural farmers. It's time to get serious.

Managing Foreign Exchange Risk

By Esther Manase, Stanbic Bank Tanzania

Foreign exchange losses have been the subject of much pain and heartaches to financial managers across many businesses. In some sectors and business rate movements have torn big holes into otherwise sound financial performance of business. In this first part series, we make a brief simple introduction to Forex Risk and high level view some available alternatives to manage the risk.

Foreign exchange risk is type of market risk that arises from the uncertainty on the outturn of the rate on a future date. In a country such as Tanzania where the economy practices managed-floating currency, there is always the risk that what the exchange rate will be in future date is not ascertainable in the present.



After one of its most turbulent year in recent year in 2015, few perhaps may have expected the Tanzanian shilling to be so stable against the dollar this year. Indeed, predicting the path of asset prices such as foreign exchange rates consistently is extremely difficult. So much so that globally and locally many companies have gone under the heavy burden of forex losses stemming from holding too much forex assets or liabilities with rate moving against them. As such, financial market experts worldwide employ many complex tools as well as spending significant sums all in the hope of being able to better predict future changes in currencies and manage forex losses.

A stable currency is most desirable for forecasting business costs; especially where there is importing and exporting activities associated with the business. These are activities that necessitate the use of foreign currency. Depending on whether you are buying or selling to or from the Rest of the World (ROW) the exchange rate and its movements will necessarily imply movement in your costs/revenue base.

Whereas a typical importer business is looking to buy goods from abroad and sell them in the local market, they will be concerned with shilling weakness, as this will increase their cost of goods sold denominated in local currency. Conversely, for an exporter, who sells

to goods and services from Tanzania abroad; they stand to benefit from a shilling weakness, as each dollar is exchangeable for more and more local currency.

The concept of hedging is one that refers to undertaking transactions to minimize risk. There is several foreign exchange risk hedging alternatives that are generally available to businesses to attempt to better manage their foreign exchange risk. We will briefly discuss the most common ones below:

Forward Transactions: a forward foreign exchange transaction is one where the rate to be used at a future date is determined and agreed at

today. This price to be used in the future is called a forward price. In doing forward FX transactions a client is trying to ascertain the future cash outflow that will be required to secure one currency for another.

The advantage of foreign exchange forwards is that they can determine with certainty the future cash flow. Forwards though are not without potential disadvantages, as there is the possibility that the actual market rate on the future date is a much better price than the forward price.

Foreign exchange options: This works like insurance where one pays a premium for protection against unfavorable changes in spot rates, as well as full protection in favorable changes for specific amount and time. The premium charged in this case will differ depending on amount, time and target price. On the date of transaction the buyer of the option has the right but not the obligation to execute it. This allows them to either trade at the option rate or go into the market

if the market happens to be offering a better rate.

Foreign exchange Swaps: Swaps are mostly recommended for companies who earn both foreign and local currencies. In this case one temporally borrows funds in one currency in exchange for another in order to lower the overall cost of funds.

Mentioned are just some of the commonly used tools used to hedge against foreign exchange risk.

We recommend for companies to have clear FX risk management policies highlighting risk appetite, products, tenors and amounts that will be allowed to participate in. When it comes to the philosophy of whether to hedge or not, at times doing absolutely nothing and hedging everything are the same thing. Both show an absolute conviction on future rate movements. Therefore where uncertainty exists, it is advisable to consider hedging a portion of the exposure.



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The challenge of finance in HORTICULTURE

By Michael Jerry

Access to reliable and affordable capital for investment has remained a long-standing challenge facing value chain actors in agriculture. For many years, financial institutions such as commercial banks have been reluctant to lend money to agriculture production on the grounds that it is quite risky to recover the loans due to unforeseen challenges. And in reality, lending to agriculture has declined significantly in Tanzania as compared to other countries in the region.

The challenge is compounded by the limited knowledge on what is available for funding opportunities to the private sector for farmers to benefit from. Within the financial sector, there is acknowledgement of limited capacity regarding overall understanding of the horticulture operations.

Therefore, given these circumstances, TAHA established an Access to Finance Unit, a strategic independent unit to deal with the industry's access to finance matters. The unit's core mandate is to represent the industry in various financial negotiation platforms, identify financial service provider partners, facilitating strategic linkages between credit providers and the industry and organizing for capacity building programs etc. The unit has a bigger objective of establishing an industry driven farmers' revolving

credit fund in the future. Some of the current established mandates so far have been as follows: -

A Financial Directory: With specifics on agricultural related financial products available in financial institutions. The document contains contact details of the institutions and will be engaged as a tool to link industry players with available financial service providers.

Farmers Financial Model: In collaboration with financial institutions and vegetable exporting companies, TAHA developed a financing model where farmers will be accessing affordable loans from the financiers. A total of 1,300 farmers have been assessed for loan consideration.

Loans Applications: TAHA participated effectively in linking farmers to financial institutions and assisting entrepreneurs in loan application processes. This assisted the networking process with financial enterprises which included Mwanga Community Bank and CRDB respectively.

TAHA organized two Agri-Finance fairs in Manyara and Zanzibar to address the existing challenge of access to financial services. The event attracted twenty seven (27) exhibitors amongst which were commercial banks, Micro-Finance Institutions, input service providers and NGOs with more than eight hundred (800) farmers participating.





Therefore, given these circumstances, TAHA has established an Access to Finance Unit, a strategic independent unit to deal with the industry's access to finance matters...

This led to the engagement of several financial institutions to develop loan products for horticulture industry through the following developments of Partnership Framework Agreements.

- Mwanga Community Bank - To serve our members in Kilimanjaro region both individual and Farmers' Groups
- FINCA microfinance – To serve Morogoro Farmers
- Vision Fund Tanzania serves Arusha TAHA members through solidarity model (group guarantee Model), which enables thousands of farmers to access credits worth of millions to cater for various agribusiness needs.

Through the access to finance unit, TAHA conducted a study to determine best saving and lending models targeting smallholder farmers prevailing in 2015 which are practiced in Northern Zone. The main aim of the study was to learn, improve and share best models to the public. Industry Funding/Financing

opportunities included information capturing, analyzing, summarizing and disseminating it to members.

This led to analyzing and disseminating various funding opportunity information that was beneficial to our various members. From this activity, several opportunities arose such as Tanzania Venture capital and Private Equity offered by TPSF project, Small Enterprise Assistance Fund (SEAF) offered by KASI Agriventure, Trade Finance loan For exporters Offered by Triodos Bank and Africa Enterprise Challenge Fund (AECF)

In the last quarter of 2015, TAHA also came up with a special initiative of providing zero interest credit inputs to farmers under agronomists' guarantee. This initiative started with seeds and trellising ropes in Arusha and Morogoro regions.

The access to finance unit was able

to organize a training "Horticulture Trade Lending" targeted at loan officers and managers from financial institutions which offer agricultural loans to improve understanding and knowledge on how to assess, structure and manage horticulture loan portfolios.

In addition to that TAHA held various consultation meetings with decision makers from prominent financial institutions such as NMB, Barclays and CRDB banks as a sensitization program on opportunities available for them in Horticulture Industry.

This led to the engagement of several financial institutions.....



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- Bontera is suited to a wide variety of agricultural applications
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 - Floriculture
 - All types of agriculture crops

Soil Health

Soil is made up of air, water, decayed plant residue, organic matter from living and dead organisms, and minerals, such as sand, silt and

clay. Increasing soil organic matter typically improves soil health since organic matter affects several critical soil functions. Healthy soils are also porous, which allows air and water to move freely through them. This balance ensures a suitable habitat for the myriad of soil organisms that support growing plants. It's not difficult to improve soil health. Here's how: till the soil as little as possible; grow as many different species of plants as possible through rotations and a diverse mixture of cover crops; keep living plants in the soil as long as possible with crops and cover crops; and keep the soil surface covered with residue year round.

Why Microbes in Bontera Matter

Microbe-rich-soil reduces the need for chemical fertilisers. Bontera Microbial Soil Enhancer allows reduced chemical fertiliser use and creates an optimal, balanced growing environment, as nature intended.

Soil Health Benefits

Farmers who manage their land in ways that improve and sustain soil health benefit from optimized inputs, sustainable outputs and increased resiliency. Healthy soils benefit all producers – managers of large, row crop operations to people with small, organic vegetable gardens. Healthy soils provide financial benefits for farmers, and gardeners, and environmental benefits that affect everyone.

Healthy soils lead to:

Increased Production – Healthy soils typically have more organic matter and soil organisms which improve soil structure, aeration, water retention, drainage and nutrient availability. Organic matter holds more nutrients in the soil until the plants need them.

Increased Profits -Healthy soils may require fewer passes over fields because they are only minimally tilled and they aren't over-reliant upon excessive

nutrient inputs to grow crops. Healthy soils can increase farmers' profit margins by reducing labor and expenses for fuel, and optimizing inputs.

Natural Resource Protection

-Healthy soils hold more available water. The soil's water-holding capacity reduces runoff that can cause flooding, and increases the availability of water to plants during droughts. Good infiltration and less need for fertilizers and pesticides keep nutrients and sediment from loading into lakes, rivers, and streams. Groundwater is also protected because there is less leaching from healthy soils. Additionally, fewer trips across fields with farm machinery mean fewer emissions and better air quality.

Soil Health Management Systems

Implementing Soil Health Management Systems can lead to increased organic matter, more soil organisms, reduced soil compaction and improved nutrient storage and cycling. As an added bonus, fully functioning, healthy soils absorb and retain more water, making them less susceptible to runoff and erosion. This means more water will be available for crops when they need it. Soil Health Management Systems allow farmers

to improve profitability because they spend less on fuel and energy while benefiting from the higher crop yields resulting from improved soil conditions.

Microbes in Bontera brings back Soil Health. Microbes help build soil highways. Soil highways are necessary for the efficient transport and storage of moisture and nutrients. They increase soil aggregation and infiltration.

The nutrient cycle and living soils

The mineral cycle also improves significantly when soils are kept alive. Maintaining a living soil often requires that rates of synthetic fertiliser be reduced, to enable microbes to do what microbes do best. Around 90% of the nutrients taken up by plants are first cycled through the soil food-web.

No amount of NPK fertiliser can compensate for compacted, lifeless soil with low wettability and low water-holding capacity. Indeed, adding more fertiliser often makes things worse. Tillage may provide a 'quick fix', but is detrimental to soil fungal

networks and earthworms, increases the susceptibility of the soil to erosion and in the longer term depletes the more resilient forms of soil carbon.

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Together we will transform the agriculture sector and allow sustainable long term solutions to farmers who are our most important partners.



Meet Pamela

the Greenhouse phenomenon

By Sandra Kabongoyi, **TAHA**

Ms. Pamela Stephen Lyamuya is a bubbly 39 year old who after 15 years as a flight operations manager with a license in flight operations/dispatch, decided to leave the security of her job and venture into self employment with a focus on commercial farming...

Greenhouse farming has been acclaimed for its advantages such as lack of dependency on vulnerable climate and weather changes, healthier yields, lower operating costs and plant diseases. In Tengeru, a small village in Arusha's neighborhood, behind an unassuming black gate reside two green houses measuring 16 x 15 and 27 x 16 meters respectively. The small scale-farming farm is located on $\frac{3}{4}$ of an acre and prides itself with eleven (11) beds with ninety (90) plants per bed and weekly production estimates of approximately 250kgs. The first cropping cycle that usually lasts up to 6 months has been able to facilitate the proprietor with enough income to recover her initial investment capital of 36 million Tanzanian Shillings.

Ms. Pamela Stephen Lyamuya is a bubbly 39 year old who after 15 years as a flight operations manager with a license in flight operations/dispatch, decided to leave the security of her job and venture into self employment with a focus on commercial farming. She describes it thus far an adventurous one year, of no regrets and goes on to call upon the youth and women who are looking for entrepreneurship ideas not to shun farming. With the ever-increasing population in Africa and urbanization, the amount of land left and allocated to farming has been reduced in size thus making Green House farming an alternative for urban farmers.

With a family already invested in entrepreneurship, her decision to quit her job and join commercial farming was

supported, however, some of her family members were skeptical and needed a bit of convincing. Pamela understood that it was not going to be a smooth transition but she was well equipped with such a great positive mentality, as she determinedly says, "Losing was not an option."

She also had strong inspiration figures in her grand mother, a passionate farmer who gave her the very first and basic tips earlier on in life, that set her confidence and later on a bedrock that propelled her to her current success. Her second inspiration came from a motherly figure she also refers to as a mentor, her former boss, Iris McCallum, who always advised her to not let anyone ever bully her or tell her that her ambitions were impossible to achieve. Having started working in aviation at a young age, fresh out of school, McCallum set high standards for the young Pamela, standards she has upheld in her now personal agribusiness and are set to take her business to great heights.

Marketing her produce primarily came from a network of family and friends and by word of mouth; a good and reliable reputation soon formed which saw her business contacts increasing to include some tourist hotels in and around Arusha. Tanzania Horticulture Association (TAHA) with whom she is an associate member has been helpful and she sings praises in their regard for unwaveringly offering technical support, marketing linkages for her produce and using her farm as reference point to



(Top) USAID Official Judith Kitivo visits Pamela's farm. (Top right) Ms. Pamela shows off her capiscum harvest. (Bottom Left) Pamela poses in one of her greenhouses. (Bottom Right) Anthony P. Chamanga, Chief Manager Development, TAHA listens in as Pamela explains her work at the farm on a recent visit.

visiting donor organisations which has also upped her profile.

She also mentions Rijk Zwaan, Bontera and IRRICO as great suppliers who have been a part of her successful journey in farming so far. Green house farming has come with some challenges – from the unpredictable weather, counterfeit seeds and pesticides, ready markets for produce but Pamela insists that with great networking and partnerships from the right stakeholders who are great advisers has saved her from making losses and unnecessary mistakes that would have in the short and long run affected her business.

Pamela's greenhouse farming has given birth to JACPA GREEN, a horticulture supplying company. If she was going to be taken seriously by

buyers, she realized she had to have a professional address thus the company idea, which has been in operation for the last 3 months and employs 3 full time workers.

One of them Mr. Musaki John Peter, the care taker of the green houses was happy to show us around with expertise of a well seasoned farmer with a passion for farming – a trait he insists, one has got to have for this kind of job. Tending to the growing of capsicum peppers commonly known as yellow peppers or ilanga and passarella or red peppers, Mr. Musaki explains that because of their short planting period of approximately 95 days, a longer harvesting period coupled with high demand, both on the local and export market has made green house

farming particularly for capsicums very popular in Tanzania.

For Pamela, everything seems to be going very fast since she set out on this self employment venture in commercial farming, however, for this young entrepreneur, more than anything during our interview, it is her determination that shines through when she shares her dreams, when she talks about her farm and when she shares her story.

It's a story of a believer, a voice of determination, of self-belief and of hard work - an inspiring success story for all aspiring farmers worth emulating.



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ECO-FRIENDLY NETS

A Physical Control Solution for Vegetable Production

By: Sandra Kabongoyi¹ and Thibaud Martin²,

¹ TAHA, Arusha, Tanzania

² Cirad - Icipe, Nairobi, Kenya

Vegetable production is expanding rapidly, to feed the growing urban population in sub-Saharan Africa. To protect crops against pests, smallholders practice intensive chemical control, which pollutes the environment and is a threat to public health. To avoid the need for pesticides, a team of scientists from several organizations

worked with smallholders in Kenya on the installation of nets over vegetable crops.

The nets, which are simple and easy to use, reduced the insecticide quantities sprayed on cabbage and tomato crops by between 70 and 100%. They also improved vegetable quality and yields and can be re-used

for up to five years on different crops. The Tanzanian company A to Z Textile Mill produces distributes and recycles nets in the region and researchers are now working to boost the protective effect of the nets against small insects, which can pass through the holes. The project, called BioNetAgro, was funded by USAID and CIRAD and conducted by CIRAD and Michigan State University,



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in partnership with KARI, Tanzania, Egerton University and ICIPE

in Kenya, INRAB, Abomey Calavi University, and an NGO, APRETECTRA, in Benin, and A to Z Textile Mills in

Over the last decade the production of fruit and vegetables has become a vital agricultural sector in

sub-Saharan Africa because of their high economic returns and contribution to nutritional security. This sector has the potential to improve agricultural and

economic diversification, particularly for small holder farmers who can shift their production to target local, regional, and export markets. However,

production is still well below optimum potential and does not always meet the standards of safety and environmental quality. The major constraints are economic (land pressure and low investment capacity) and agronomic (management of pest and disease, irrigation and fertilization). To fight against pests, small holder farmers generally rely on chemical pesticides due to very limited access to integrated pest management (IPM) techniques, and lack of training on available IPM techniques.

By ignorance of alternative methods, farmers often think that the only solution to their pest problems lies in the application of pesticide doses, and at higher frequency when in fact it worsens the situation by selecting resistant populations. In the tropics, the increasing use of chemical insecticides is widespread because of their ease of use and availability in the local market. This phenomenon is amplified by the selection of insecticide resistant pests, the high value of vegetables, and an increase in demand to feed urban populations resulting in wide scale and intensive cultivation. On the other hand, awareness among urban consumers on the quality of their food and harmful effects of poisonous residues due to improper use of pesticides has increased greatly. Hence, the horticultural crop producers, especially small holders, face the challenge of producing more, with reduced dependence on chemical pesticides.



AgroNet (0.9 mesh size) tested for protecting tomato crops in Egerton University, Njoro, Kenya (photo T. Martin).

Physical control using insect nets can meet this challenge by increasing yields through reduction in losses due to pests and simultaneously reducing insecticide applications. Further, the potential to produce such nets in large quantities in Africa lies with several industries developed in sub-Saharan Africa to produce bed nets promoted by the World Health Organisation (WHO) to fight against malaria. Hence, it is only needed to transfer and adapt this technology to protect vegetable crops in Africa.

A physical barrier against pests

1. Cabbage.

Cabbage is by far the most chemical insecticide sprayed crop in sub-Saharan Africa. This is due to the ability of the diamond back moth, *Plutella xylostella*, a key pest of cabbage, to quickly become resistant to insecticides. For this reason many growers in Benin abandoned its

production. However, Insect Nets with a mesh size of about 1.6 mm have proven quite effective in protecting cabbage crops against pests, both in the nursery and after transplanting in Kenya, the use of nets on cabbage reduced the insecticide spray application by about 70% when compared with the usual insecticide sprays application used by small producers.

2. Tomato.

The insect net type AgroNet (0.4 and 0.9 mm mesh) nets have proven to be an effective barrier

in protecting tomato against its major pest, the tomato bollworm *Helicoverpa armigera*, which attacks the leaves and fruit. As a result, physical barrier, nets are also effective against the leafminer, *Lyriomiza* spp, a major pest of tomato. Preliminary results showed the effectiveness of Agronet against *Tuta absoluta*, a recently invasive pest in West and East Africa. Against whiteflies, nets with a mesh of 0.4 mm drastically reduced the outbreaks on tomato in Kenya. Nets also proved effective in protecting the crops from severe damage caused by birds during fruit ripening, which tends to be severe in the tropics. In experimental stations, no chemical protection was required to protect the tomatoes under the nets in the major cropping seasons in Kenya.

3. Green bean.

In Kenya, green beans were very well protected by AgroNet 0.9 mm mesh against the bean fly, *Ophiomyia* spp.,

which destroyed 90–100% of non protected beans, by a chemical based on a systemic insecticide such as a neonicotinoid. The protection of green beans with nets also significantly reduced the infestations of whiteflies and aphids compared with non protected plants. We also observed that the thrips, *Frankliniella* spp., were fewer under the nets. According to Antignus and Ben Yakir (2004), the spectrum of light radiation used for navigation and orientation plays an important role in the behaviour of insects. The lower pest populations on green beans protected by nets compared with no nets could then be explained by the additive effect of a visual and physical barrier.

Long lasting treated nets

Long lasting nets treated with pyrethroids have been recommended for several years by the World Health Organisation to better protect human populations against the malaria vector, *Anopheles gambiae*. We applied this technology to improve the effectiveness of nets not only against small sucking insects (aphids, whiteflies, thrips), but also against other pests that can lay their eggs on the nets. In the laboratory we showed the irritant and repellent effect of treated nets on the whitefly *B. tabaci* (Martin et al., 2014) and the aphids *M. persicae* and *Lipaphis erysimi* (Martin et al., 2013). Nets impregnated with alphacypermethrin significantly reduced the rate of passing through the net by aphids and whiteflies compared with untreated nets. In Montpellier, France, the effectiveness of alphacypermethrin treated AgroNet in protecting cabbage crops against aphids was 100%. On green beans in Kenya, aphid and whitefly infestations were significantly lower under the

treated AgroNet compared with no net and on tomato; whitefly infestation was also lower under treated net. The resistance of whitefly to pyrethroids could explain this low effectiveness.

Research is ongoing not only with nets impregnated with permethrin, a molecule known to be more repulsive, but also with non toxic natural compounds. On Lepidoptera, recent studies at the University of Catania, Italy, showed the repellent effect of treated AgroNet on the tomato leafminer, *T. absoluta* - an invasive pest from Latin America, and recently reported in sub Saharan Africa. Impregnated nets could be recommended for use in greenhouses/ tunnels to reduce the rate of passage of this pest.

Treated Nets could also be recommended to protect nurseries for small producers to reduce the risk of early viral infection by plant viruses transmitted by whitefly. In sub Saharan Africa, insect pests are a major constraint to vegetable crop production. Among these pests, Lepidopteran larvae are the most important because they directly damage leaves, flowers, and/or fruit. Nets can effectively control most of the moths. For insects laying their eggs on the nets or passing through the nets, nets treated with a toxic, repellent or irritant product may be a solution. The protection of vegetables against Lepidoptera and Diptera with a physical barrier reduced the use of chemical sprays by 70–100%. While this technology could incur significant initial costs, the potential for multiple uses over 3–5 years significantly reduces the lifespan cost of the technology.

The nets offer multiple benefits of seedling protection in the nursery. Nets reduce the number of chemical spray applications required and increase the production in quantity and also quality. Conventional use of chemical insecticides in sub-Saharan Africa has a broad spectrum of activity against several insect pests, but they also have negative impacts on parasitoids and predators. Their continuous use in agriculture over the last 50 years has selected resistant populations, especially among pests.

This has resulted in the emergence of multi resistant populations necessitating increased dosage and frequency of the use of chemical sprays. The reduction of chemical use in vegetable crop systems, made possible by the use of anti insect nets that could be easily combined with biological control methods for better management of sucking pests (such as aphids, whiteflies, thrips, and mites), offers potential solutions to some of these drawbacks. The ability to transmit plant viruses with a direct impact on production is key threat from several sucking pests. However, early season protection in the nursery against these viruses through the use of nets can significantly improve plant productivity.

By ignorance of alternative methods, farmers often think that the only solution to their pest problems lies in the application of pesticide doses



POTATO GRATIN

A LA NEGHESTI (SERVES 5-6)

By Nancy Sumari, **TAHA Nutrition Campaign Ambassador**

Meal Ingredients:

Gratin
2kg Potatoes
Diced Bacon
8 slices Ham
Cooking Cream 200ML
3 Eggs
Mozzarella Cheese grated
Salt 2 tbps and pepper seasoning
Vegetables
Cauliflower
Broccoli
Baby Carrots
Green Beans

Gratin Preparation:

Preheat Oven to 175 Degrees
Wash thoroughly and peel potatoes and cut them in circular shapes
In a baking tray, arrange half of the potatoes overlapping each other and marinate with salt

Arrange ham slices on top of the potatoes and top with half of the cheese and finish off the rest of the potatoes on the tray and add marinate. Sprinkle the bacon bits in the potatoes
In a separate dish, beat the eggs in the cream and whisk until properly mixed.

Pour the cream mixture on top of the potatoes and sprinkle remaining cheese on top.

Cover with foil and place in the oven
Let it cook for 45 mins and then remove foil and leave it in the oven for a further 10 mins before serving



Peel
potatoes
and cut
them in
circular
shapes

2kg
Potatoes

Vegetable Preparation:

Wash all Vegetables

Separate cauliflower and Broccoli
from stem

Place in a cooking pan and add
seasoning and water

Boil over medium heat for 10-15
minutes until softened

Drain water and serve.

Potatoe
SLICES

Broccoli

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