

*Catalysing sustainable agriculture and nutrition...*

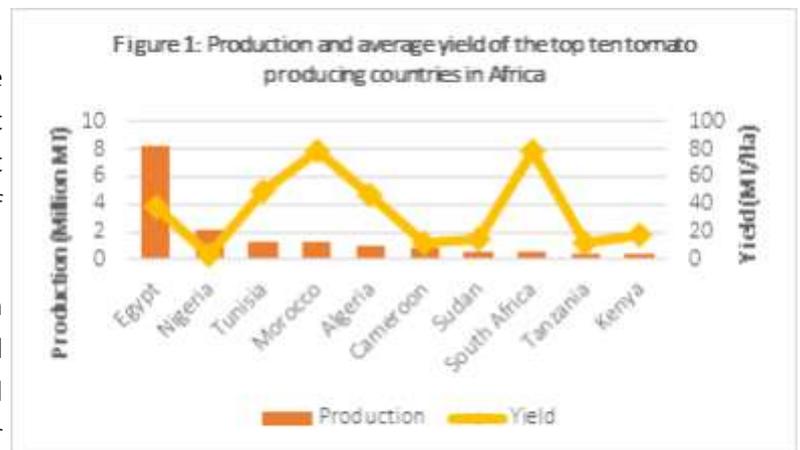


## The Tomato Value Chain in Nigeria

Tomato is widely cultivated across Nigeria. Smallholder farmers planting on between 0.5 and 4 hectares of land account for 90% of production, with the balance contributed by commercial producers (Sahel research, 2015). Nigeria has the largest area harvested for fresh tomato in Africa with 541,800Ha followed by Egypt with 214,016Ha (Faostat, 2014).

However, Nigerian farmers on average generate the lowest yields for tomatoes in Africa at 4.0MT/Ha which is significantly lower than Egypt with 38.7MT/Ha and South Africa with yields of 78.7MT/Ha in 2014 (Faostat, 2014).

Yields are low because of the poor production practices including usage of old varieties, low soil fertility, inadequate pest and weed control and the high post-harvest losses due to the poor handling and distribution system. In effect, 40-50% of tomato produced in Nigeria is lost due to the poor handling, processing and preservation practices in Nigeria (Sahel research, 2015).



*“...Nigerian farmers on average generate low yields from tomato production due to the poor practices and high rates of post harvest losses”*

## Critical Production Challenges

### Tuta Absoluta: The Cause of All Your Tomato Problems

Tuta Absoluta, commonly nicknamed ‘Tomato Ebola’ by farmers, was first discovered in South America and has spread rapidly across the world from Zambia to Italy to Oman and as of 2015, to Nigeria. The pest eats both green and mature tomato fruit, but prefers to tunnel below the leaf surface or burrow into the plant’s stalk. It can destroy an entire tomato farm in two days and is extremely difficult to control as it has a high mutation capacity, thus quickly becoming insecticide-resistant.



Source: Tomato crisis' spreads panic in Nigeria. CNN.com

In 2016, the price of tomato skyrocketed by 400% within three months, as Tuta Absoluta destroyed the annual harvest, affecting tomato farms across Kaduna, Kano, Katsina, Jigawa and Plateau states. Despite the fact that Nigeria is the 14th largest producer of tomatoes in the world and the largest producer of tomatoes in Sub-Saharan Africa, the traders were compelled to import tomato from neighboring Chad, Burkina-Faso and Cameroon.

Agronomists advise that the best way to counter the epidemic is through prevention because the pest's infestation, it is almost impossible to cure and save the harvest. Clearing all crop residues, reduces the pest survival rate. Additionally, the application of recommended chemicals containing active ingredients such as Imidaclopid; Indoxacarb, Spinosad, Deltamethrine (against adult moths); and Rynaxypyr two weeks after planting, followed by re-application of a different chemical containing the same ingredients with a different formula, to kill off those that survived the first round will drastically diminish the chances of infection. Still, as most farmers in the country cannot afford integrated pest management, most of their crops cannot be sold because of the infections and the rotting in the vegetable.

In May 2016, the government promised to tackle the problem by setting up a two-day National Economic Council retreat aimed at setting targets for self-sufficiency in tomato. In 2017, Tuta Absoluta was spotted again, this time destroying tomato harvests in Gombe State.

## Innovations focused on Reducing Post Harvest Losses

There is an increasing interest in cost effective interventions to address the high rates of post-harvest losses, as well as some promising practices that can be adopted across the value chain to maximize the shelf life of tomatoes. Some of these practices could extend the shelf life of tomatoes from two days to three weeks. For example, smallholder farmers in some developing countries use household chlorine bleaches to rinse and sanitize tomatoes. This practice can eliminate bacterial diseases such as speck, spot and canker, and ensure tomatoes stay fresh before sale. Other benefits of such practices include improved market value, reduction in diseases, and increased incomes for smallholder farmers.

Some initiatives focused on reducing post Harvest losses includes:

### Global Alliance for Improved Nutrition Initiative: GEMS4 and PLAN

#### • *Growth and Employment in States – Wholesale and Retail Sector (GEMS4)*

The Good Handling Practice for perishable produce initiative is an intervention designed to provide smallholder tomato farmers with the skills, tools and incentives to handle their produce in a way that extends shelf life between 2013-2017. GEMS4, provided training and capacity building to 75 master trainers in Kano, Kaduna and Lagos, master trainers have since gone on to provide on-the-job training to tomato farmers in rural areas on good postharvest practices such as the use of returnable plastic crates for packaging. The GHP initiative has resulted in the following key achievements:

- The adoption of GHP by key stakeholders such as the Fresh Fruits and Vegetable Dealers Association of Nigeria.
- As at December 2015, 4,065 perishable produce handlers use good handling practices to improve the quality of perishable produce for sale.
- 17% reduction in damaged or poor-quality produce reaching target markets in supply chains supported by the initiative.



Source: Sahel field visit, Mile 12 Market, 2017

- **Post-harvest Alliance for Nutrition (PLAN)**

In 2016, GAIN has developed the Postharvest Loss Alliance for Nutrition (PLAN) to bring together the multitude of public and private sector actors addressing this issue to collectively reduce loss and waste of nutritious foods. The Post-harvest Alliance for Nutrition (PLAN) is currently exploring models that allow smallholder farmers lease returnable plastic crates (RPC's) at affordable prices for tomato packaging in place of the handmade weaved raffia baskets commonly used by tomato farmers. Some of the objectives of the initiative include:



- Increase investment in efficient communication throughout the value chain to improve timely delivery of raw and perishable commodities.
- Encourage and incentivize banks to consider cold chain logistic investments to improve capacity and availability of cooling, storage, and refrigerated transport facilities for perishable produce.
- Support compliance and better communication of government food safety guidelines and standards that are not well understood by private sector and need to be published and made accessible free of charge.
- Facilitate the Nigerian Government working with farmer and trucking associations that run the major food markets to create mutually beneficial strategies in sanitation, food safety, and storage of perishable produce for farmers, buyers, and consumers of fresh nutritious foods.

## Rockefeller Foundation: YieldWise Food Waste Initiative

The Rockefeller foundation has launched YieldWise, a \$130 million initiative to demonstrate how sub-Saharan Africa can cut post-harvest losses in half by 2030. The initiative, which is 7-year programme, seeks to:

- Increasing farmer access to technological solutions to reduce post-harvest losses such as the introducing plastic crates for transporting tomatoes, utilizing airtight storage options to help farm produce stay fresh.
- Build diversified, sustainable value chains by fostering partnerships between smallholder tomato farmers and large food buyers such as Dangote Farms Limited.
- Engage global businesses to account for the food wasted in their supply chains and increase awareness of food waste in their processes and its effect on bottom line.

## Other Innovations ...

### Packing Houses

Packing houses are large storage facilities where fresh fruits and vegetables are collected, washed, sorted and stored in pre-coolers before distribution to the market for sale. Packing houses are a great way to ensure maintenance of quality across the postharvest chain. For example, ZZZ, a South African company, has six tomato packing houses situated on the Limpopo province and operated on a seasonal basis; which allows for easy transportation from the field to the packing houses after harvesting.

In Nigeria, the Kaduna State Government has commissioned the first tomato “value addition aggregation” packing house to assist local farmers in minimizing their post-harvest losses.



Source: Envirogro Farms

## Solar Powered walk in Cold Rooms

Solar powered cold storage facilities are also a relatively new development aimed at improving the shelf life of perishable goods like tomatoes, while also reducing the high energy costs required for operations of cold rooms.

Coldhubs, a Nigerian company, has introduced innovative solar powered walk-in cold rooms to be installed in strategic food production and consumption centers (e.g. markets and farms). The company adopts a subscription model that enables smallholder farmers to store their produce before sale without the high recurring cost of energy for prolonged cooling in traditional cold rooms. With more of their harvest to sell, smallholder farmers will be able to increase their annual incomes, and reduce malnutrition significantly.



## Zero Energy Cool Chamber (ZECC)

A more cost-effective storage facility for tomatoes is Zero Energy Cool Chambers (ZECC). These are double brick wall structures, with cavities filled with sand and walls soaked with water. These chambers are easy to build with bricks, sand and bamboo and do not require any electricity or power to operate. Fruits and vegetables are placed in plastic crates and staked in the cool chambers. This practice can reduce temperature by 10-15°C and maintain high humidity of 95% that can increase the shelf life and retain the quality of horticultural produce. Practices such as ZECC are more common in the Asian tropics, in countries such as Sri Lanka and India. They could easily be adopted in other developing countries including Nigeria as they have been found to be simple, easy and cost effective for smallholder farmers.



## Tomato & Nutrition



Various forms of tomato

The nutritional and health benefits of the tomato fruit cannot be overemphasized. Different clinical studies have proven that people who eat tomatoes regularly have a reduced risk of contracting chronic diseases such as lung, prostate, stomach, cervical and breast cancer. This could be attributed to the high levels of vitamin C, vitamin A, potassium, iron and 'Lycopene', which is responsible for its red vibrant colour. Lycopene prevents the immune system from being attacked by free radicals, damaging molecules that disrupt normal cells and spread cancerous cells.

Tomato preservation involves the processing of fresh tomatoes into other forms such as dried tomatoes, ketchup, paste, juice and puree and concentrate. This processing affects the lycopene content of the derived products.

**Table 1:** Tomato forms and their lycopene content

PRODUCT	SERVING SIZE	LYCOPENE CONTENT(mg/serving)
Tomato juice	15ml	1.5
Tomato ketchup	15ml (1 tbs)	2.7
Spaghetti sauce	15ml	3.4
Tomato paste	15ml (1 tbs)	6.9
Tomato soup (condensed)	15ml prepared	0.6
Raw tomato	15g	0.45

However, care must be taken to ensure that canned tomato paste packaged by FMGCs actually contain substantial quantities as opposed to large starch fillers, which is often the case. Similarly, mold content must be minimized when tomatoes are dried in open air conditions.

### Tomatoes: Effects of Heat

Typically, fruits and vegetables are best eaten raw. However, tomato actually increases its lycopene content with heating. Cooking tomato in a bit of oil breaks down the cell wall and releases the Lycopene. In addition, apart from the water-soluble vitamin C, tomatoes do not lose any of their nutritional value in the high heat processing, making canned tomatoes and sun dried tomatoes just as viable and beneficial as fresh tomatoes. A study conducted by Fielding et al showed that when individuals consumed tomato juice heated with oil, their blood lycopene levels increased more than when plain, unheated tomato was consumed. Another study reports that blood concentration of lycopene increased nearly three times when tomato paste was consumed than when fresh tomatoes were eaten. This implies that canned tomatoes can be used as a replacement for fresh tomatoes especially which is especially useful due to the current hike in tomato prices in Nigeria.



Source: Sahel field visit, Mile 12 Market, 2017



Some processed and packaged tomato consumed in Nigeria



Tomato stew



Jollof Rice

Local Nigerian dish made with tomatoes

## Thinking of Investing in a Tomato Greenhouse?

In Conversation with a Leading Agripreneur in the Tomato Green House Landscape  
Mrs. Nkiru Okpareke, Co-founder and COO – Envirogro Farms, Epe Lagos State -[www.envirogrofarms.com](http://www.envirogrofarms.com)

### 1. Why is the use of greenhouse technology so popular among agripreneurs?

For many farmers who have been in greenhouse business for years, it is much more than a frame covered in polythene, polycarbonate or nets. It is an organized system that works together to produce the results that the farmer desires. The advantages are as follows:

- In the greenhouse, the farmer controls the elements of production under partial or full controlled environmental condition to get optimum growth and productivity. The key elements which the farmer may control include the greenhouse temperature, the amount of light, the system of irrigation, fertilizer application and the atmospheric humidity.
- Farmers can grow crops all year round regardless of the season, which is a large advantage versus subsistence farmers who only plant during the rainy season. In addition, the greenhouse allows for climatic control within the enclosure, which enables farmers to grow many different types of crops.
- Growing in a greenhouse exposes crops to lower risk of pest invasion and infection because of the protected environment and fosters less use of chemicals
- Greenhouses enable for higher yields from the same variety of seeds when compared to the ones planted in the open field
- There is the opportunity for continuous harvest from the same plant over a longer period of time with use of indeterminate seeds which are developed mainly for greenhouses
- Allows for more efficient use of water by using irrigation and fertigation systems



Source: Envirogro Farms

### 2. What are the cost implications for setting up a greenhouse?

The cost implications vary depending on whether the farmer chooses to import the structure or construct it locally.

Locally constructed greenhouses cost between N200,000 and N500,000 for an 8M X 24 M size, depending on the wood and galvanized steel used. They typically do last more than 3 years, as termites weaken the wooden poles. Temperature and humidity control may also prove challenging, as well as strong winds which may pull down the structure.

Imported greenhouses cost between N1M and N2M for the same 8M X 24 M size, depending on the manufacturer and the country of origin. The steel structure constitutes on average about 70% of the total greenhouse cost. However, this structure could last for at least 30 years, with changes to the plastics and the nets required approximately every 5 years.

*“...Growing in greenhouses exposes crops to lower risks of pest infection...”*



Source: Envirogro Farms

### 3. Is this market for tomatoes produced in greenhouses oversaturated?

No, the market is not oversaturated. When current production meets the local demand, there is an opportunity to explore the export market as a high percentage of the vegetables consumed in Europe is from East Africa, so Nigeria has the opportunity and resource to compete with them for that market.

### 4. What market opportunities exist?

There is a high demand for the tomatoes that are typically grown in green houses – beef tomatoes, and cherry tomatoes. The demand from supermarkets and hotels is high because the exchange rate has made imports very expensive so companies have to depend on local farmers to meet their needs. Also, the seasonality of tomatoes especially because of seasonal rains and pest attacks like Tuta Aboluta also creates an opportunity for high returns.

### 5. What are the challenges associated with managing a green house?

The disadvantages include:

- High initial cost of investment in the green house and the supporting infrastructure
- Higher cost of operations in terms of either heating or cooling the enclosure for the plants.
- Humidity in the green house which is a breeding ground for diseases.

- Skilled personnel who has the expertise in growing produce in a green house are typically more expensive.
- Maintenance of the structure as the plastic and nets will undergo wear and tear.
- Availability of high quality inputs like hybrid seeds suitable for our environment and quality chemicals required for high yields.

### 6. What are five questions an aspiring agribusiness entrepreneur should ask before making an investment in a greenhouse?

- A.) Is the Return on Investment worth it? Is it high enough to dedicate financial resources and energy to?
- B.) Will I be able to find competent personnel with the necessary expertise to run the operations with specialized skills and years of experience in agronomy? Are all the inputs I need readily available from reputable sources?
- C.) Where is the best location to set-up operations? Is it close to market? Good water source?
- D.) Do I have the staying power to run this business for a long term, as agriculture is a long term business with a lot of risk?
- E.) Is this venture scalable?

*“There is a high demand for the tomatoes that are typically grown in green houses – beef tomatoes, and cherry tomatoes...”*



Source: Envirogro Farms

## Sahel Speaks...

### Sahel Capital Partners & Advisory Limited:

- **Exploit 2017:** Ndidi Nwuneli, Managing Partner, spoke about “Opportunities in the Agribusiness Sector” at Exploit 2017 organized by the Salem International Christian Church in Lagos on April 27th, 2017.
- **Eastern Institute for Entrepreneurial Studies forum:** Ndidi Nwuneli spoke on “Culture of Excellence & Entrepreneurship in Everyday Life” at the Eastern Institute for Entrepreneurial Studies forum in Enugu on May 11th, 2017.
- **African Development Bank Annual meeting:** Nathalie Ebo, Associate Partner, was a discussant on the “Civil Society Panel” at the AfDB General Annual Meeting in Ahmedabad in May 2017.
- **EAT Forum:** Ndidi Nwuneli provide a presentation titled – “Outliers in Global Impact” – the Ingredients for Success at the EAT Forum in Stockholm Sweden, June 11th, 2017

### Sahel Capital Agribusiness Managers Limited:

- **African Development Bank Annual meeting:** Mezuo Nwuneli, Managing Partner, spoke on panel titled “Innovative Financing for Agriculture” at the 2017 African Development Bank’s annual meetings in Ahmedabad, India on May 23rd, 2017.
- **The Roundtable Lagos:** Mezuo Nwuneli spoke on “Exploring Business Opportunities in Agriculture” at The RoundTable Lagos, hosted by Church4Real on June 10th, 2017.
- **Afrique Africa Conference:** Olumide Lawson, Partner, spoke on two panels “Venture Capital and Blended Finance in the Food and Agribusiness Sector” and “Lessons Learned From Investing in Nigeria's Food and Agribusiness Sector” in Abuja on June 12th and 13th, 2017.
- **APL Seminar Series:** Mezuo Nwuneli spoke on “Attracting Investment to the Agricultural Sector” at the ALP Seminar series, hosted by Akindelano Legal Practitioners at Oriental Hotel on June 28th, 2017.
- **SUN Business Network:** Sahel participated in a panel on “Access to Finance for Business in Nutrition” at the SUN Business Network (SBN) 2nd Anniversary Convening held on July 4th, 2017.

## Sahel Announcements...

**Sahel Scholars Programme:** Sahel will be launching its **Sahel Scholars Programme** on July 7<sup>th</sup> at the University of Nigeria Nsukka Campus. The purpose of the programme is to identify and help develop the next generation of agribusiness professionals. Sahel will host a seminar on the agricultural sector, share information on its initiatives, and at the end of the process two high performing students will be selected for a 3-month internship at Sahel, rotating between its management consulting and private equity units. These interns would also benefit from a scholarship provided by Sahel for their final year at university.

## Sahel in the Press...

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