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Fostering community entrepreneurship in clean seed yam production

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Acronyms

Abbreviation	
AYMT	Adapted Yam, Minisett Technique
DDS	Diocesan Development Services
DFID	Department for International Development
FC	Farmer Council
IITA	International Institute of Tropical Agriculture
MSHR	Missionary Sisters of the Holy Rosary
NDE	National Directorate of Employment
NGO	Non-Governmental Organisation
NOAS	National Open Apprenticeship Scheme
RIU	Research Into Use
SAP	Strutural Adjustment Programme
SMEDAN	Small and Medium Enterprise Development Association of Nigeria
SYIP	seed yam insurance programme
UNIDO	United Nations Industrial Development Organisation
YIIFSWA	Yam Improvement for Income and Food Security in West Africa
YMT	Yam Minisett Technique

Abstract

This paper summarises experiences to date with the promotion of seed yam entrepreneurship in Nigeria as part of the Yam improvement for Income and Food Security in West Africa (YIIFSWA) project. The work described here has mostly been centred upon the Idah area of Kogi State; an area referred to as Igalaland.

The main findings are that:

(a) Farmers can make a healthy **profit** and **return on investment** from growing seed yam but the relatively **high cost** of the Adaptive Yam Minisett Technique (AYMT) when compared to other cropping options is an important consideration for the farmer.

(b) A limitation to sales of seed yam is the **absence of a local value chain** that connects farmers to a seed yam market in Idah. This strikes at the very heart of being able to generate a sustainable clean seed yam system as in the absence of such a value chain the farmers tended to keep all their seed yams for planting the next season. There is **little incentive** for them to grow more seed yams than they need.

(c) Seed yam entrepreneurship can be facilitated but the results suggest that the establishment of a **sustainable clean seed yam system** in the Idah area is still some way off.

(d) While the basis for MSHRs activities in promoting these seed yam farmers may be regarded as **community entrepreneurship** there are still missing links in the system. MSHR has begun to sound out **local yam traders** to see if they can be encouraged to help set up the value chains and the work is very much ongoing.

(e) The establishment of the AYMT entrepreneur plots does present a degree of **risk** for the farmer. Over the four years of the programme described here, two years in particular (2012 and 2015) had a significant loss of plots because of flooding. Given the cash investment required to establish these plots there is understandably a degree of concern from the farmer. There are no insurance systems in place and one question that may be asked is whether it may be possible to establish a **seed yam insurance programme** (SYIP)?

1. Introduction: Yam in West Africa

White yam (*Dioscorea rotundata*), herein referred to as yam, is a major root crop grown predominantly in West Africa, most notably Nigeria, Ghana and Côte d'Ivoire. The yam tuber (Figure 1) is rich in carbohydrate (75 to 85% on a weight by weight basis) and provides an excellent source of vitamins and some minerals (Muzac-Tucker et al. 1993).

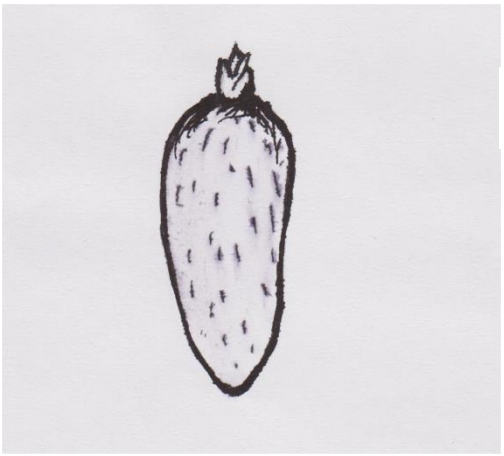


Figure 1. Yam tuber

Yam tubers are also richer in protein content than are those of other major root crops grown in the region such as cassava (*Manihot esculenta* L; family Euphorbiaceae; Muzac-Tucker et al. 1993) and food prepared with yam is said to be much better taste than that prepared with cassava. Also, given that yam is thought to be indigenous to West Africa it is not surprising that the crop has much cultural significance, and some societies have yam festivals and appoint a 'king' of yam growers (Hahn et al. 1987). Because of its nutritional value, taste and greater cultural status yam tubers do fetch a relatively high market price compared with many other crops grown in the region and can be a valuable cash crop (Verter and Becvarova 2014; Mignouna et al. 2014). Farmers will put much resource into growing, storing and marketing their yams (Figure 2).

Figure 2. Yam plants growing along the banks of the River Niger (Nigeria) in 'heaps' and with bamboo staking and rope trellising to allow the plant to 'climb'.

However, while yam does have a high status because of the points noted above it is a challenging crop to grow for a number of reasons. Firstly, it needs to be grown on fertile soil with a good supply of water (Orkwor and Adeniji 1998; Oyetunji and Osonubi 2008). The location of the yam plot in Figure 2 on a nutrient rich soil in the flood plain of the River Niger, Nigeria, is a good example of an ideal location for growing yam. Secondly it is demanding of labour, especially for land preparation and harvesting (Oguntade et al. 2010; Nweke and Ezumah 2012). The land has to be cleared and formed into ridges or heaps, and the farmer typically provides trellising for the vine so as to maximise the capture of light energy (Figure 2). As the tuber can be a couple of kilograms in weight and grow down into the soil then harvesting can be challenging, especially as this typically takes place during the dry season when the soil becomes hard and any damage to the tuber can result in pest and disease attack during storage (Korada et al. 2010; Morse 2011). Any damage to the yam tuber during harvest or transportation from the farm provides an entry point for pests and diseases, and this is one of the reasons why harvesting of yam typically is undertaken by specialists. Storage systems can also be sophisticated and laborious to construct and manage, as shown in Figure 3 where individual tubes have been tied to a wooden framework to maximise ventilation and reduce the risks of pest and disease transfer between tubers. Thirdly, while yam has a relatively high price in the market it is an equally expensive crop to grow. Propagation takes place via 'seed yams', small whole tubers between 0.25 and 1 kg in size, or yam 'setts', *cut pieces of a yam tuber*, and this presents a potential problem in that pests and diseases can readily be transmitted via the vegetative material. Farmers will typically save their own planting material as a 'by product' of the main 'ware yam' crop (i.e. the crop grown for household consumption and sale). For example, they may put aside the smaller tubers as seed yams, cut some of the larger tubers into setts or undertake a process of 'yam milking' where the plant is allowed to keep growing after the main ware yams have been harvested. But this comes at a cost as Aidoo et al. (2011) note that farmers may typically have to retain 10 to 30% of their harvested material for planting the next season. For farmers that need to buy planting material in the market then the cost will be high, especially as price is strongly linked to the quality of the tubers. Better quality tubers are relatively free of damage from pests and diseases but come at a higher price. There are some specialist seed yam markets in major yam growing areas and one of the prominent Nigerian markets is shown in Figure 4; this is Illushi, Edo State, on the western bank of the River Niger. Farmers will travel from many miles around, often by boat, to purchase seed yams at this market, something that comes at a cost both for the seed yams and transportation.

Given the significant challenges involved in the production of yam it is perhaps unsurprising that it lags behind cassava, a much cheaper and easier crop to grow, in a number of key statistics as shown in Figure 5 for Nigeria; the country that produces most yams in West Africa. The area of both yam (red line) and cassava (blue line) has gradually increased in Nigeria (Figure 5a), more or less in line with an estimated population that has increased from 46 million in 1961 to 178 million in 2014, but it is interesting how the yield of yam (Figure 5b) fell significantly during the mid-1980s. This was a period of economic turbulence in the country due to the introduction of a Structural Adjustment Programme (SAP) promoted by the World Bank and International Monetary Fund; the decline in yam yield may well reflect a number of factors such as a drop in use of imported and hence expensive inputs (fertilizer, pesticide) and the use of poorer quality planting material which would generate a lower yield. The decline in yield during the 1980s is also reflected in a decline in total production (area X yield; Figure 5c) and production per capita (Figure 5d). It is noteworthy that cassava did not show a similar trend during the period of SAP and its aftermath, probably because of its lower cost of production and better availability of planting material (stem cuttings).

Figure 3. Yam barn, with tubers tied to a vertical ‘rack’ of sticks to help encourage air circulation and limit pest and disease attack.

Figure 4. Seed yams for sale in Ilushi market, Edo State, Nigeria. Tubers are separated into ‘piles’ based on ownership, variety and quality (mostly based on visual appearance).

The availability of good quality planting material at a price that farmers can afford has long been noted as a significant limiting factor in yam production, and various approaches have been research and promoted in an attempt to address this (Asumugha and Chinaka 1992; Chikwendu et al. 1995). Yam is a complex mix of varieties that can be dioecious, meaning that it has male and female individuals, monoecious and hermaphrodite, and also has a variable flowering behaviour. The result is that the crop cannot easily be propagated by using true seed. Hence in practice farmers mostly use tuber-based planting material, although there has also been some work on the potential for using stem cuttings. A tuber can be cut into setts, each of which will germinate if it has a viable bud and produce a new plant and tuber. As a general 'rule of thumb' the larger the size of the sett then the larger the size of the resulting tuber, and there is a natural 'trade off' here between on the one hand trying to maximise the number of setts from an individual tuber and also ensuring that the resultant tubers are not too small or big. In the late 1970s the Yam Minisett Technique (YMT) was developed as one possible answer to this conundrum. In its initial form the YMT involved the cutting of a 'mother' yam tuber into minisetts of approximately 25g in size. These were treated with an insecticide and fungicide dust before being planted in a nursery. Once germinated the setts were transplanted into the field where they produce seed yams of around 200 to 250g in size. Thus, using the YMT a mother tuber of around 1 kg in size could generate 40 minisetts and if each of these germinated this would result in a multiplication ratio of 1:40. However the YMT had only limited, and indeed geographically patchy, uptake from farmers in Nigeria (see, for example, Okoro 2008), largely because of the additional labour involved and the risk of minisetts not germinating. Indeed, given the high cost of yam tubers the latter is especially relevant from the perspective of the farmer. Ironically, a further issue with the YMT was that it only produced seed yams. These seed yams can be used to generate ware yams the following year but resource-poor farmers may be reluctant to grow a crop unless it can generate an immediate return in food or cash. A further dilemma surrounded the apparently inflexible recommendation for farmers to use 25g minisetts at the nursery stage. This 'one size fits all' recommendation promoted by extension services did not encourage farmers to experiment with different sett sizes and agronomic practices best suited to their circumstances.

In the early 2000s an adaptation of the YMT was developed which employed a larger sett size that in turn allowed the setts to be planted directly into the field without a nursery stage. Also, rather than use pesticide dust which stayed on the outside of the sett the new version – called the Adaptive Yam Minisett Technique (AYMT; Morse et al. 2009; McNamara et al. 2012; Morse and McNamara 2015, in press) – employed a pesticide dip that allows for penetration of the chemicals into the flesh of the sett. In the AYMT a yam tuber is carefully cut into setts of up to 100 g (Figures 6 and 7) with no 'one size fits all' recommendation. Instead farmers are encouraged to experiment and informed that the larger the sett size then the larger the resulting tuber but seed yam size will also be influenced by plant spacing (closer spacing tends to give smaller seed yams) and soil type (fertile soil will produce bigger seed yam). The time of planting is also critical in determining seed tuber size as early planting will produce large seed tubers. Therefore, depending upon a range of variables such as variety, spacing, timing and soil type the sett size can be between 40 and 100 g, or perhaps may even be lower than 40 g depending on conditions and need. Farmers are encouraged to experiment with these variables to see what balance suits them best. The term 'adaptive' is now more appropriate as participants decide for themselves the type of seed product they require. This inherent flexibility is a significant variation on the original YMT. While this may seem to be a minor adaptation, and indeed good sense, it strikes at the very heart of valuation of knowledge that has been central to development thinking and approaches for over 25 years. The researcher and farmer should work in tandem and the researcher must not impose a 'one size fits all' approach based upon controlled experiments under field station conditions. The development literature is awash with stories and insights of what has gone wrong with

'top down' attitudes that impose an 'expert eye' view of what those meant to benefit from development interventions should be doing. This was supported by the modernisation theory that became central to development thinking after the 2nd World War. What works in ideal case scenario should be possible when transferred to a different less resourced situation.

Once the yam setts have been cut they are ready for treatment. Yams are susceptible to a wide range of pests and diseases and unless the cut surfaces are treated it is likely that the sett will die. In the YMT the cut surfaces were treated with a pesticide dust, and sometimes even with just wood ash, although this approach does have some disadvantages. Firstly, the dust tends to stay on the surface rather than penetrate the flesh of the sett where there may well be some pathogens and pests such as nematode. Secondly farmers tend to use their unprotected hands for applying the material and this, of course, is undesirable. The second innovation in AYMT was the use of a pesticide dip that replaced the use of surface dusts. In its earliest form the dip comprised two pesticides: chlorpyrifos (an insecticide) and Mencozeb (a fungicide). There are various 'formulations' of these chemicals and the precise measures obviously depend on the concentration of the active ingredients in the product. For example, if a 45% (w/w) liquid formulation of chlorpyrifos is used along with an 85% (w/w) powder formulation of mancozeb then a typical recipe for the dip would be 100 ml insecticide and 100 g fungicide in 10 litres of water. The setts are placed in a net and dipped for five to 10 minutes before pouring onto a clean, level and shaded ground free from dust and left to dry or cure for about four to 24 hours. The farmer should wear protective clothing when carrying out this process to do this as shown in Figure 8; but the use of a dip in this manner helps to minimise the likelihood of skin contact. Once dry the setts can be planted into either heaps or ridges and spaced approximately 1m between rows and 25 to 40 cm between plants (Figure 9); sometimes 50cm spacing may also be acceptable under some circumstances. As with sett size, the farmer is encouraged to experiment with spacing to suit their own circumstances rather than adopt a fixed and inflexible recommendation.

Figure 5. Some production statistics for yam and cassava in Nigeria.

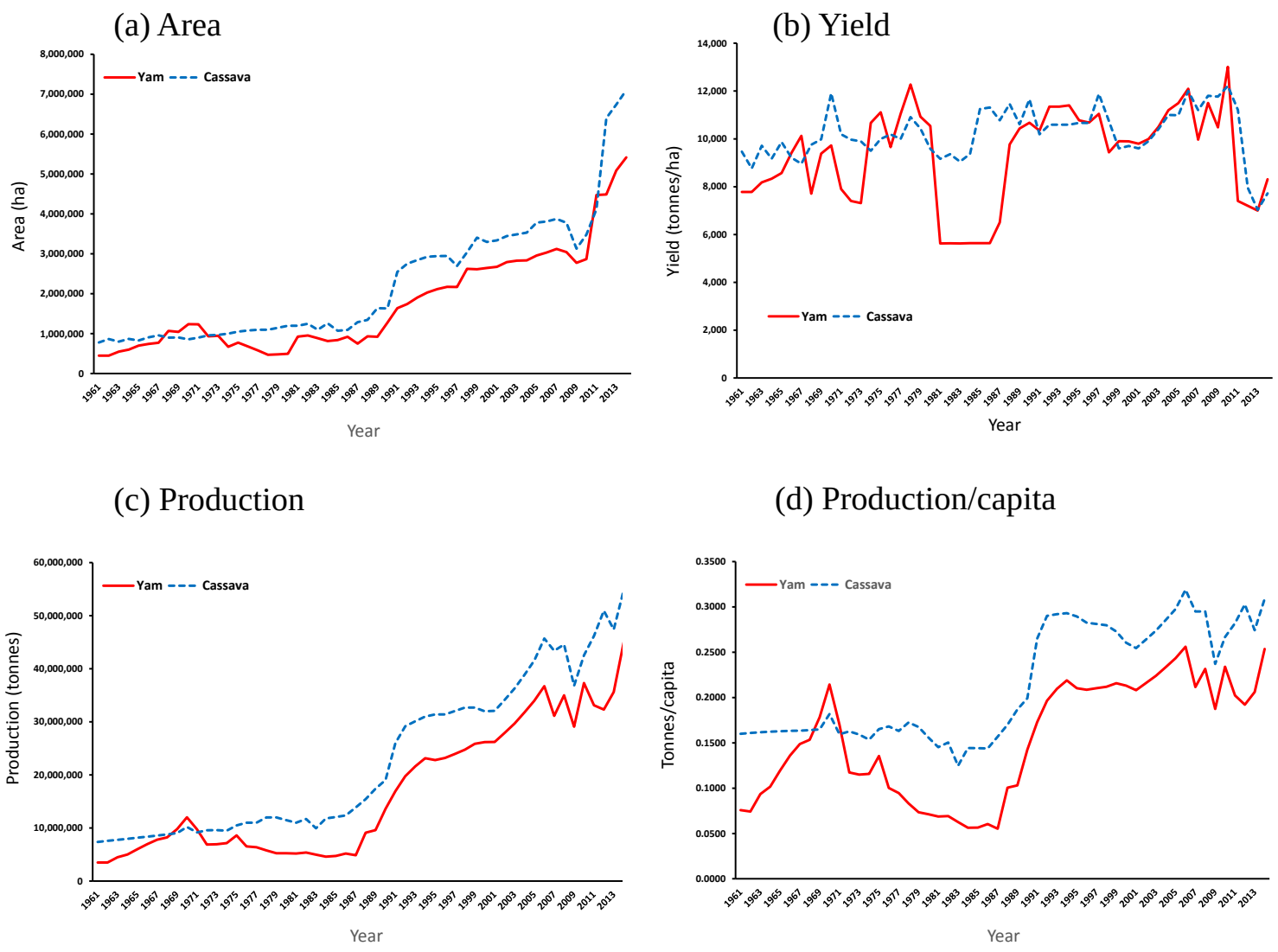


Figure 6. Cutting the yam tubers into ‘setts’ of 40 to 100g

Figure 7. Cutting the yam tubers into ‘setts’ of 40 to 100g.

Protective clothing is not required for this stage of the process but will be needed for the pesticide treatment stage.

Figure 8. Treating the setts with a pesticide dip (5 to 10 minutes) before being left to dry.

Protective clothing is required for this stage of the process.

As well as being easier for the farmer given that there is no nursery stage, the AYMT also has the advantage of allowing a range of tuber sizes to be produced, depending upon management decisions such as sett size and plant spacing, spanning a mix of seed and ware yams (yams for consumption and sale). Therefore, the AYMT gives farmers the best of both worlds; they can produce seed yams but also have ware yams that can be eaten or sold. This flexibility is one of the main reasons why the AYMT has been welcomed by farmers and it would appear that the AYMT is a more sustainable solution for the provision of clean seed yam.

Figure 9. Planting the treated setts (after drying) on ridges spaced 1 metre apart and 40 cm between plants.

As AYMT can generate a mix of tuber sizes, spanning both seed and ware yams, it has an attraction for a broad range of yam growers. However, there are still some important aspects that need to be considered. Firstly, it is risk for the farmer. Without pesticide treatment there is a good chance that the planted setts will not germinate, but pesticide is an additional cost. Also, of course, farmers have to undertake a period of trial and error to establish what is best for their circumstances. One possibility, of course, is for the farmer to become a specialist in seed yam production and supply the produce to other ware yam growers. Many of the farmers in Illushi (Edo State, Nigeria), for example, specialise in seed yam production. However, while some farmers may be willing to do this it is more likely that a number of yam growers could be encouraged to have a plot of seed yam alongside their ware yam. The seed yams produced by these 'seed yam entrepreneurs' would primarily be for their own use but ideally these farmers could be encouraged to produce a surplus which they could then sell to other farmers. Over time this approach should improve the quality of the seed yam stock in an area, and do so in a sustainable fashion. But a key aspect here, of course, is the financial viability of the AYMT under 'farmer managed' conditions. If the system is not financially viable then it is unlikely that the entrepreneurs will continue to produce seed yam, and in turn it would be unlikely that other farmers would copy what they do. The indications to date are that AYMT plots generate a positive gross margin for farmers (McNamara et al. 2012) but achieving a sustainable seed yam supply system in a place where one has not existed is a significant challenge and it is this point that is at the heart of the work reported in this paper.

This paper summarises the economic results achieved by seed yam entrepreneurs established as part of a 5 year project called 'Yam Improvement for Income and Food Security in West Africa' (YIIFSWA) managed by the International Institute of Tropical Agriculture (IITA). The project began in 2012 and the implanting partner of the entrepreneurship component was the Missionary Sisters of the Holy Rosary (MSRHR); a Catholic-Church based agency that operates in many countries across the globe including Nigeria. The MSHR team established a number of demonstrations of the AYMT but also decided to identify a number of potential seed yam entrepreneurs and work with them over a number of years to check the financial viability of the AYMT and also to explore the challenges that would emerge with the establishment of a sustainable seed yam system in a place where none has existed, in this case the region of Idah town in Kogi State, Nigeria. This paper presents the experiences and lessons of that work over perhaps the critical four years of the project – from 2012 to 2015 – and draws out a number of conclusions with regard to why and how a sustainable seed yam system can be established. While the project began in 2012 the entrepreneur component was very embryonic at that stage and results were limited.

The paper begins with the framework of entrepreneurship adopted by the MSHR team, and in particular some of the features of entrepreneurship that were expected to resonate with the wider project. The paper then outlines some of the contextual factors that lay behind the choice of location for the implementation of the seed yam entrepreneur programme. This was an important decision, and indeed the MSHR team were very careful in their choice of place. The working paper then sets out some of the results and discusses them in relation to the objective set out above.

It is important to note at this point that the authors do not claim to have all of the answers with regard to seed yam entrepreneurship, far from it, and indeed it is still very much work in progress that will likely continue well beyond the end of the YIIFSWA project. They would very much welcome any insights and advice that the reader may have.

Figure 10. A seed yam entrepreneur with his harvest from an AYMT plot.

2. Seed yam entrepreneurship

Fostering seed yam entrepreneurship (McNamara et al., 2012) has been regarded as a central component of the Yam improvement for Income and Food Security in West Africa (YIFSWA) project. It appears directly under activity 3.6 of YIIFSWA where it states that the intention is to establish a total of 10 clean seed yam entrepreneurs in Nigeria. The seed yam entrepreneurs were to be encouraged to develop a business based upon the use of the AYMT (Morse et al., 2009; Morse and McNamara, 2015, in press) to generate clean seed yams. The assumption is a straightforward one. The supply of good quality seed yams at an affordable price has for many years been regarded as a significant constraint to ware yam production. Planting material is a major cost for ware yam production, and given that yam as a crop suffers from a range of pests and diseases that attack tubers and which can be 'carried over' in the planting material then it is no surprise that farmers are willing to pay a premium for good quality seed yams. Ware yam is the main crop, the one that provides both food security and income, and many farmers will either produce their own planting material or purchase it at the start of the growing season. But relatively few farmers specialise in seed yam production and it is likely that a very high proportion of the planning material sold in markets has been produced by ware yam growers and is being sold because the growers have already met their own needs. Hence in YIIFSWA it was assumed that the encouragement of some farmers to specialise in seed yam production would help address this bottleneck. Asking some farmers to specialise in seed yams should enable them to put more resource into ensuring that the tubers are of high quality and should also increase supply to the market and hence keep prices under control. It was recognised from the outset that these farmers would want to continue producing ware yams as it is this crop which provides income and food security for the household. There was never any suggestion that these farmers should switch completely from ware to seed yam production; that would be unrealistic. Some farmers may wish to do this but it was thought at the outset of the YIIFSWA project that they would be a small minority.

But, of course, a shift to resourcing seed yam production will come at a cost to the farmer in the sense that the resources could be used for other enterprises. Each household has a limit – a maximum availability of capitals with which to generate income and security – and the key each year is to deploy these to the best possible benefit. If resource is allocated to seed yam production then less resource is available for other activities. Households do not have a bottomless pit of resource available to them and in reality they have to manage trade-offs between the various options open to them. Devoting significant resource for seed yam production may be a relatively new option for farmers but it has to prove itself as a viable option otherwise the farmers will just allocate their limited resources elsewhere. Indeed, this is perhaps where the promotion of seed yam production is an unusual option. As noted above, yam farmers do already produce their own planting material using a variety of techniques including milking or the cutting of setts, but these can be conceptualised as off-shoots from their main endeavour – the growing of ware yams. Hence the inherent contradiction that appears at the heart of any encouragement of seed yam production by farmers:

1. Most farmers do produce their own planting material almost as a by-product of the main concern (ware yam). This option maximizes the potential for food security and income
2. But they may not necessarily produce enough planting material of the desired quality. This can result in reduced production (area of ware yam and yield) in the subsequent season.
3. Farmers may have to purchase planting material from elsewhere and this can be expensive because of points 1 and 2.
4. But changes to point 1 (the obvious solution) so as to increase the supply of quality planting material generates a risk as any attempt to devote resource to the growing of good quality

planting material detracts from the allocation of resource to other activities such as ware yam production.

Therefore, there is a real dilemma here, and not one that is necessarily obvious to an outsider. It is not so much that encouraging some farmers to engage in seed yam production is asking them to do anything new per se – it is not - but it is asking them to break out of the delicate logic set out in the above list. In effect they are being asked to take a risk for the wider community of yam growers, even if the production of seed yam is profitable in itself. It is entrepreneurship – but not as we usually know it.

It is the above that made the entrepreneurship dimension of YIIFSWA so intriguing and exciting for the MSHR partner in the YIIIFSWA project. It was not just about the promotion of entrepreneurship but it was about the creation of a new mind set; a new way of thinking about how entrepreneurship can play a role in supporting a community. This was quite a challenge.

The objective of this paper is to explore the experiences to date of MSHR in the facilitation of seed yam entrepreneurship as part of the YIIFSWA project. The insights will primarily cover four of the five years of the project (2012 to 2015) and the intention here is to draw out some lessons that will help inform future thinking regarding future seed yam research. The emphasis in the paper will also be very much on the more socio-economic aspects of the entrepreneurship intervention rather than the agronomic. It is therefore not the intention of the authors to set out in any detail the AYMT and to compare the effects of using treated and untreated setts. These aspects have been well-covered in other publications. Finally, it has to be noted that seed yam entrepreneurship was just one small aspect (in terms of resources devoted to it) within the YIIFSWA project. YIIFSWA covers many aspects of yam production and marketing in both Nigeria and Ghana and the reader is referred to other publications available via the project website to get a sense of the breadth of work in which project engaged.

While MSHR have been engaged within YIIFSWA to work in a number of yam growing areas - Kogi State, Edo State, Benue State and the Federal Capital Territory – the results reported here are only those from Kogi State, notably the town of Idah and its environs. This emphasis largely derives from a decision made by MSHR to concentrate its facilitation of entrepreneurship in a place that it knew very well and where there was maximum trust in place with yam farmers based upon many year's previous work there. While such an apparently narrow focus in just one small place in a very large country may appear to limit the wider applicability of any insights it is important to note that depth matters a great deal. Over the four years of work reported here MSHR managed to get to know these entrepreneurs very well and there was much scope for mutual learning between all involved. This proved to be a significant advantage.

The next section of the paper explores the meaning of entrepreneurship and in particular it discusses the types of entrepreneur that are often portrayed in the literature. This is followed by a brief discussion of entrepreneurship in Nigeria and the factors that work in favour and indeed against it. Both of these sections take a broad perspective on entrepreneurs that go beyond agriculture. The paper then moves on to set out the geographical, social and cultural context within which seed yam entrepreneurship was facilitated within the YIIFSWA project in the Idah area of Igalaland. This context is important as it helps provide the basis for why decisions were made the way that they were. A key decision, as noted above, was to work with the same farmers over time rather than change them every year. The reader is then provided with some of the agronomic and economic results obtained over the four growing seasons. The agronomic results of AYMT have been covered in other publications, most notably in Morse et al. (2009) and Morse and McNamara (2015, in press) and are only covered here

for the sake of completeness. However, the dataset spanning four years allowed for a new analysis that took into account changes in the agronomic variables over time; a point not explicitly covered in the published papers on AYMT. The primary focus now is upon the economic results although these do, of course, need to be digested with some care as they are only based upon relatively small plot sizes (400m^2) of seed yam. However, they do nonetheless provide some useful insights and points for further exploration and discussion. Finally, the paper will draw together all of the experiences to date with the seed yam entrepreneurs and make some suggestions for future research.

Figure 11. Yam tubers being transported by boat to and from Idah market along the eastern bank of the River Niger.

3. Entrepreneurship; a framework

The term 'entrepreneur' has been said to derive from the French word 'entreprende' which means to 'begin something' or to 'undertake'. Hence at its simplest an entrepreneur can be said to be someone who begins something. However, the term is normally associated with those starting up a business, but it could equally apply to someone starting any type of organisation such as an NGO. But this rather simple definition is not enough for some:

> "*Entrepreneurship is not a science that can be perfectly defined, but rather an amalgamation or medley of art and science, which displays itself with a combination of factors in a range of different settings, contexts, industries, countries and times*." (Tobora, 2015; page 32)

> *"Entrepreneurship is more than simply "starting a business." It is a process through which individuals identify opportunities, allocate resources, and create value. This creation of value is often through the identification of unmet needs or through the identification of opportunities for change."* (Chidiebere et al., 2014; page 24; emphasis added)

This sense of 'creating value' made by Chidiebere et al. (2014) is an important one and will be returned to at various points in this discussion. It is not just about money; value could be seen as a providing a social benefit within a community. Njoku et al. (2014; page 23-24) provide further elaboration as to what they see as the characteristics and function or an entrepreneur:

> "*The entrepreneur as a person brings in overall change through innovation for the maximum social good. Human values remain sacred and inspire him to serve the society. He has firm belief in social betterment and he carries out this responsibility with conviction. In this process, he accelerates personal, economic as well as human development. The entrepreneur is a visionary and an integrated man with outstanding leadership qualities. With a desire to excel, he gives top priority to Research and Development. He always works for the well-being of the society. More importantly, entrepreneurial activities encompass all fields/sectors and foster a spirit of enterprise for the welfare of mankind*."

There are some interesting ideas here such as the idea that entrepreneurs work for the good of society and indeed 'mankind' rather than just for themselves. It is certainly in tune with the ideas of MSHR when they began the process of identifying and promoting seed yam entrepreneurs. The idea was to set up a service from which the community could benefit. However; it has to be said that this is certainly not a view shared by all. The following are some definitions provided by other researchers (with emphases provided by the authors)

> "*According to Schumpeter, (1995), entrepreneurship is a process of change where innovation is the most vital function of the entrepreneur. In his words, the entrepreneur is an innovator who carries a combination of the following: introduction of a new product, opening of new market, conquest of new sources of materials and the organisation of new industry*." (Salewa and Ikechukwu, 2012; page 804)

> "*the process of using initiative to transform business concept to new venture, diversify existing venture or enterprise to high growing venture potentials*" (UNIDO, 1999)

> "*entrepreneurial development is a disposition to accept new ideas, new methods and making people more interested in present and future than the past*." (Peter and Clark, 1997 cited in Egai, 2008)

The emphasis in these definitions on 'new idea' and innovation is an interesting one. Do entrepreneurs really have to have new ideas or can then take an old idea and use it different (and not necessarily new) way? Within YIIFSWA the aim was to encourage the seed yam entrepreneurs to adopt the AYMT. But the AYMT can hardly be said to be new at the time of YIIFSWA; it was developed by a series of DFID projects in the early years of the 21st century and even then the AYMT is a variant on the much older Yam MInisett Technique (YMT) developed in Nigeria in the early 1980s. Hence can it be truly claimed that the farmers encouraged to adopt the AYMT are entrepreneurs according to these definitions that place emphasis on innovation? Well much does depend on meanings of course, and arguably these farmers are innovators in the sense of adopting an existing technique at scales that other farmers were simply not doing.

But entrepreneurship is not only about innovation and doing 'new' things, there is also an element of risk:

> "*Entrepreneurs are individuals who engage in some risk-taking behaviour in investing resources to achieve a goal*." Mtika (2013)

> "*Entrepreneurship can be defined as a specialised knowledge that entails teaching learners the skills of risk-taking, innovation arbitrage and co-ordination of factors of production in the creation of a new products or service for new and existing users in human society for economic ends*." (Towobola et al., 2014; page 74)

Adopting AYMT at scale is certainly a risk as noted above with the chain of logic that locks farmers into ware yam production.

Given the emphases in the above definitions on innovation, 'new' and risk it is perhaps not surprising that the sort of attributes typically associated with the entrepreneur include those shown in Table 1. Many of the items in the list in Table 1 are understandable although the inclusion of 'God-fearing' may perhaps be somewhat contentious. Do successful entrepreneurs really have to believe in God?

There are various typographies of entrepreneurs, and Mtika (2013) suggests a division based upon motivation into two main types and a third which hybridises elements of the other two (Table 2).

Table 1. Characteristics of entrepreneurs (after Carnevale, 1990, cited in Osunde, 2014)

Type of skills required	Key words and phases
Personal	Hard working Self-discipline Confident Determined Innovative Visionary Risk-taker Consistent Independent Lead Amenable to change or flexible God-fearing
Creative/technical	Communication Writing Engineering technology Environmental management monitoring Interpersonal relation Building Networking Coaching Organizing Art making Technical drawing
Business	Decision making: accounting/finance, managerial, marketing/sales, information and operational/logistics skills. Able to keep proper accounting records Financial/investment details Promote sales Communicate effectively to give clear instructions and direction Build good feasibility studies Able to exploit the Strengths, Weaknesses, Opportunities and Threats (SWOT) in his environment for survival of competition.

Table 2. Types of entrepreneur (after Mtika, 2013)

Type	Aims
Business or economic entrepreneurs	Organize and manage resources to make profits and add value to their businesses
social entrepreneurs	Driven by the need to improve people's life chances.
community entrepreneurship	Combines the economic (business) and the social entrepreneurial ventures in a community. Intuitive implementation of new and unreasonable ideas that involve the creative utilization of dormant labour but with a two-sided goal of making (a) an economic and (b) a social difference in a community.

Of the types listed in Table 2 then one that perhaps comes to most people's mind is the first one – business/economic entrepreneurs. The motive here is clearly for the entrepreneur to do well in economic terms. But the second category is also an important one. Here the motivation of the entrepreneur is to help improve people's lives and an excellent example is found with the creation of the Grameen Bank in Bangladesh during the 1970s by Professor Muhammad Yunus who was then at University of Chittagong. The Grameen Bank, a micro-credit provider that focusses primarily on the poor in Bangladesh, is not about maximising profits per se, although it does need to cover its costs. But entrepreneurs can move between these two categories and an example is provided by Bill Gates, the founder of Microsoft and subsequently the Bill and Melinda Gates Foundation. He arguably began as an economic entrepreneur but later became a social entrepreneur. It is also likely that many business entrepreneurs also have in mind the generation of jobs and opportunities for their employees and do not have a sole focus on profit.

For the YIIFSWA project the category in Table 2 matches what MSHR had in mind namely 'community entrepreneurship'. Here it is recognised that the economic driver is an important consideration but the aim is not only to generate profits but also to aid the community. To an extent this category only emphasises what some entrepreneurs within both the business and social categories of Table 2 already have in mind. The Grameen Bank, for example, does have to generate some profit for it to be able to cover its costs and limit the need to seek funding from donors; a topic that these authors covered in some depth in previous publications (McNamara and Morse, 1998).

When MSHR began its work to identify and promote seed yam entrepreneurship in the YIIFSWA project it had in mind an approach that is similar to the community entrepreneurship model of Table 2. It was not just about encouraging some farmers to maximise their profits via seed yam production but to help set up a system by which the wider community of yam farmers would benefit from. As Mtika (2013; page 3) explains

> "*A main feature of this type* [community] *of entrepreneurship is its endogeneity, that is, (i) its focus on building entrepreneurial knowledge, skills, and capacity within communities and (ii) its goal of propagating innovative, inventive, creative, and environmentally responsible behaviour among community members in their production and consumption activities. This does not side line the profit-making motif pursued by marginalist economics but integrates that motif into the central goal of spreading the wealth among the masses*."

Clearly the individual seed yam entrepreneurs need to be able to see a profit and their motivation is more in tune with the business entrepreneur category of Table 2. MSHR is arguably acting as a social entrepreneur in helping to promote and support the seed yam growers; its motivation is to see an improvement in the wider yam growing community that is not just about profit but also about livelihood. As Mtika (2013; page 8) stresses:

> *"A fundamental aspect of the community entrepreneurship process is that it should plug into the way people make a living."*

Together these players – MSHR, the entrepreneurs and the wider yam growing community - are providing a landscape that resembles community entrepreneurship and where partnership becomes key. It is not just about a once-off injection of resource but an ongoing commitment that allows new knowledge to be generated and shared and links to be made between the entrepreneurs and the wider research body within YIIFSWA. These links are highly valued by all and indeed as the project has progressed MSHR finds itself responding with comments similar to those made by researchers in the field of 'green entrepreneurship':

> "*These entrepreneurs have emphasised that they need not only access to skilled people at the local level, but also access to research institutions to help develop and test products and technologies; access to information; access to advisors and mentors who can add value to the enterprise; access to finance, including impact investors; and access to communications channels to promote their success.*" (Creech et al., 2014; page 375)

Figure 12. Heaps of seed yam in Illushi market, Nigeria. These have been sorted in terms of variety and quality.

4. Entrepreneurship in Nigeria

Entrepreneurship is not a new phenomenon in Nigeria (Towobola et al., 2014) though it can be claimed to embody a number of contradictions. As noted by Chidiebere et al. (2014; page 21) in their paper on youth unemployment and entrepreneurship in Nigeria:

> *"Nigeria as a country has numerous business and investment potentials due to the abundant, vibrant and dynamic human and natural resources it possesses. The performance and effectiveness of entrepreneurs in the country as an instrument of economic growth and development has long been under scrutiny. This intense scrutiny has been against the backdrop of the low performance and inefficiency that characterized small business particularly in assessing its role on economic growth and development. Tapping the country's resources require the ability to identify potentially useful and economically viable fields of endeavours. Nigerians have equally made their marks in diverse fields such as science, technology, academics, business and entertainment."*

Thus we have a country with much resource and a dynamic people who have 'made their mark' in a variety of fields yet small businesses are seen as being inefficient and having a "low performance". But why should this be so? Nigeria become independent from Britain in 1960 but Osunde (2014) argues that the government did not become involved in fostering entrepreneurship development in Nigeria until after the civil war that took place between 1967 and 1970. Indeed, Osunde (2014) suggests that these efforts to promote entrepreneurship became especially evident with the introduction of the Structural Adjustment Programme (SAP) in the mid-1980s. One of the issues that Nigeria faced since independence was the growing economic dependence on oil, and during the 1970s and early 1980s the value of the currency (the Naira) was kept high via government intervention. This made it difficult for the country to export goods and services (other than oil) although it kept the prices of imports artificially high. Thus a local entrepreneur in Nigeria was faced with strong competition from imported goods and services, and that same entrepreneur would also find it challenging to export. SAP changed all this with one wild stroke when the Naira was allowed to float on international markets where it immediately declined in value creating a situation which made imports far more expensive than previously. In addition to the changes in currency, SAP also had the effect of decreasing the control of the government. Civil servants were made redundant and quangos were closed. The idea was to promote private enterprise within the country rather than have enterprises that were state controlled. Following SAP, the government setup a number of agencies designed to promote entrepreneurship (Osunde, 2014) including:

- National Directorate of Employment (NDE)
- National Open Apprenticeship Scheme (NOAS)
- Small and Medium Enterprise Development Association of Nigeria (SMEDAN)

The government has also encouraged the promotion of entrepreneurship course in the higher education institutions.

A number of constraints to entrepreneurship have been mentioned by authors such as Njoku et al. (2014), namely:

1. Lack of Credit Facilities
2. Corruption
3. Inconsistent Government Policies
4. Multiple Taxation
5. Poor State of the Country's Infrastructure

6. Failure to Adapt to the Changing Business Environment
7. Low Standard of Education
8. Security Issues
9. Lack of venture capital
10. Poor policies from the Nigerian government
11. Lack of enforcement of Nigerian patent laws
12. Constant political turmoil
13. Religious intolerance and ethnic warfare
14. Cultural restrictions of female entrepreneurs
15. Entrepreneurship often seen as a way to 'get rich quick'
16. Poor planning
17. Poor quality of product or service
18. Negative attitude towards good/services made in Nigeria

This is a substantial list presenting a host of challenges, but the same issues tend to be repeated in other studies. For example, Adeola (2015) concluded that the following were significant challenges faced by women entrepreneurs in Akure City, Ondo State, Nigeria:

> *"women entrepreneurs face serious challenges which include socio cultural influence, lack of technological advancement, lack of policy for entrepreneurship, corruption, government's attitude towards entrepreneurship, political trends, financial constraints, bank policy and bureaucracy, lack of infrastructural development, low level of education, family responsibility, lack of access to training in their business operation."* (Adeola, 2015; pages 377-378)

Onwubiko (2011) suggests the following major constraints to entrepreneurship in Nigeria:

- Absence of Infrastructural Facilities
- Inadequate Working Capital
- Low Standard of Education
- Lack of Adequate Training

For the facilitation of seed yam entrepreneurs in the YIIFSWA project there is much food for thought in the challenges listed above, all of which MSHR would have been well aware of over many years. One in particular – the lack of 'start-up' finance has been well explored in the literature, especially as how it relates to agricultural development. The authors will return to this point in greater depth in the next section, but given that the ware yams needed to create the setts for planting are expensive then it was obvious at the outset that MSHR would need to provide some support for the entrepreneurs to help get them started. The question was whether this is best provided as cash or in kind.

As well as support with resources a further factor that appears in many lists of constraints is training, and in particular the need for training when it comes to business development. MSHR was also aware of this and decided from the start to introduce training on the creation of business plans. More on this late, but here it only needs be said that much thought was given as to how best to do the training. In the end it was decided to adopt a participatory approach whereby the entrepreneurs would learn about business plans in an ongoing manner – learn as you do – rather than by the use of formal training sessions; although the latter was adopted for a select few entrepreneurs.

5. An experience with agricultural entrepreneurship in Nigeria

5.1 Background

What is the script for the story we are telling about agricultural entrepreneurships?

We will limit the script to providing the backdrop to agricultural entrepreneurship in Igalaland, Kogi State, Nigeria. To some extent this is intertwined with wider interventions to help bring about development in Igalaland, a region devastated by the Nigerian Civil War from 1967 to 1970 as it provided the front line for much of that conflict. One of the major development initiatives undertaken in Igalaland since the early 1970s was focussed on trying to get the region back on its feet especially in agriculture, and this had to take a 'bottom up' approach that encouraged local entrepreneurship rather than attempt anything that was more 'top down'. The story behind this will be covered here. It should be noted that the following is not intended as a history of Igalaland but simply to show the forces that had shaped the kingdom up to 1970 when the Diocesan Development Services (DDS) of Idah Diocese initiated a new approach to being in development. This was in addition to the traditional health, education and catechetical services usually associated with church based services.

The story is therefore about what has happened in Igalaland since 1970 onwards. In a way the success story (in so far as there is one) can be attributed to an acknowledgement and appreciation of what existed in Igalaland by 1970; the difficulties it faced at that particular time and how what existed in that society could be harnessed with some outside assistance to bring about change in an incremental way that facilitated local participation and ownership of every intervention.

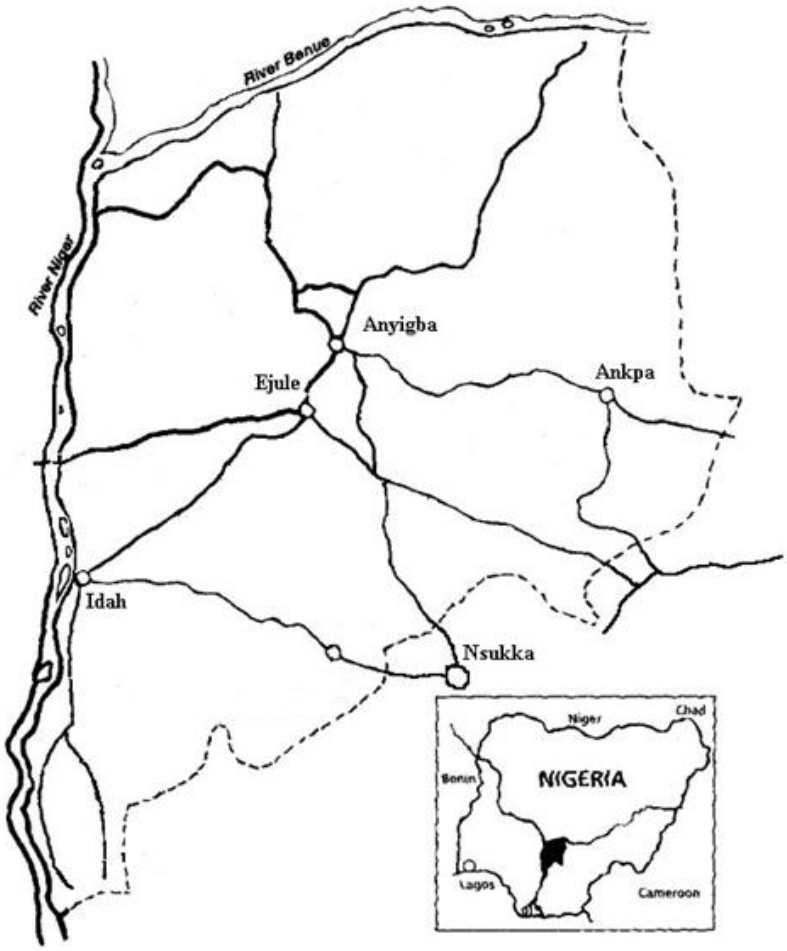
First the reader will be introduced to the geographical setting which played a critical part in understanding development in Igala. Secondly the reader will get a snap shot of the history of the Igala people who have had a long and interesting set of encounters with people within and outside what is currently regarded as the Igala kingdom. This spans at least 600 years and the different influences from that era possibly still plays a critical role in understanding development there. It has had powerful and famous Attahs (Kings) as well as many educated men and women in recent history who have helped shape its current position. Despite problems of an internal and external nature Igalaland is on a different trajectory than it was after the colonial period and in particular in the wake of the Nigerian civil war. The kingdom takes its place once again among other prosperous and committed communities in Nigeria. It is fair to say that Chief Philip Okwoli was among those people who played a part in raising the status of Igalaland to great heights once again. This was achieved mainly by engendering an appreciation among his many students, scholars and subjects of what it is to be truly Igala and challenging them to do what is required to make the kingdom known for what is greatness in the twenty first century.

The authors would therefore like to acknowledge the contribution Chief Philip Okwoli, who acted as mentor to the authors for more than three decades especially in the early days when great mistakes were possible; his tutelage recommended an appreciation of what were local strengths as well as awareness of what needed to be challenged in the traditional society. An early reading of his history of Igala and an understanding of the causes and outcome of the Nigerian civil war (when its memory was still fresh in 1970) made one of the authors in particular aware of the importance of understanding local and national history, politics, society and culture. Unless we learn about these it is difficult to know where one stands.

5.2 Geographical setting

The Diocese of Idah (Figure 13), where the work described is located, is coextensive with the kingdom known as Igalaland which covers about 13,665 kilometres, and represents approximately 1.5% of Nigeria's land area. It currently comprises that part of Kogi State which lies south east of the Niger Benue confluence. Its main city, Idah, an old river port, lies on the eastern bank of the river Niger at 7°05’00”N 6°45’00”E7.08333°N 6.75000°E is also its social and cultural capital. Idah had a population of 79,815 at the 2006 census and is the seat of many important government, social and diocesan institutions despite not being at the geographical centre of the kingdom. Because Nigeria has passed through a number of political reorganisations since independence in 1960, this territory has at different times formed part of Kwara, Benue and Kogi States.

Figure 13. The Catholic Diocese of Idah



Idah’s strategic location on the Niger River, afforded it a gateway to and from the interior of Nigeria, thereby creating opportunities for political, cultural, social and economic development. But as will be seen later, it suffered setbacks at various times which relegated it to a Cinderella status and for a time it became virtually isolated, cut off from the rest of the country by its many rivers- to the north, west and south. The problem was partly rectified in 1985 with the completion of the bridge between Itobe and Ajaokuta over the River Niger. This facilitated contact with the Federal Capital Territory (FCT) - Abuja - and indeed is of benefit to the Federation as a whole and not just Igalaland. In 1996 the bridge over the River Anambra at Egabada on the federal road to Nsukka to the east was completed. Proposed bridges across the Niger River from Idah to Agenebode (Edo State) and Shintaku to Lokoja

are yet to be considered despite their ferry services having been discontinued for many years. Its general lack of infrastructure retarded the development and progress of the Igala people for many decades.

The population has now increased to two million people according to the 2006 census which means it has doubled in just over 40 years. The predominant ethnic group is the Igala. Two other smaller groups, the Bassa Komo and the Bassa Nge (approx. 0.1 million), reside in the northern part of Igalaland. The religion of the Igala people is mixed, and the majority are thought to be Muslim although no authoritative figures exist to support this. Christians, both Catholic and Protestant, are also numerous. There is high level of religious tolerance and it is not unusual to find traditional believers, Christians and Muslims in the same family. Traditional religion is also common; Christianity and Islam are relative newcomers. Indeed, it is often said that the incidence of traditional religion is often masked by the familiar Islam and Christianity, and that many practising Muslims and Christians still have strong 'traditionalist' affiliations also.

5.3 Understanding the history that shaped Igala attitudes especially to development and entrepreneurship

The Igala kingdom is among the oldest centralised societies in the country and it is well established that this kingdom was at different times a famous and powerful force in Nigeria. The first recorded events in Igala history date back to the end of the 15th century when an Attah of Benin origin ruled from a centre of power and culture at Idah (Okoli, 1972). He established political relationships with other Nigerian kingdoms far and near; it is believed that the son of an Attah of Idah founded the ancient town of Bida, to the north-west in the present Niger State. But towards the end of the 15th century the Jukuns began a reign over Igala. These war-like people had expansionist policies whose empire became very extensive. For a time Igalas had to serve this alien kingdom, but the Attah Ayegba refused to be their vassal and eventually expelled them from his territory. Unsurprisingly he is regarded as the greatest of all the Attahs of Idah.

After the death of the Attah Ayegba, the influence of this kingdom declined slowly at first, but more quickly later on. This decline was hastened by the Fulani Jihad (1804) which eventually destroyed the glory of the states of the Niger Benue confluence: Nupe, Igala and Jukun (Okoli, 1972).

At another high point in its history the Nupe kingdom to the north-west, also part of the present day Niger State, paid tribute to the Attah of Idah and once again the primacy of the Igala kingdom was evident:

> *".....when the Europeans first entered the Niger, the population along its bank from just North of Onitsha to the neighbourhood of Bara (now in Niger State) admitted themselves tributary to the Attah" (This means they paid tax to the Attah, most likely in kind*). Allison (1946)". Taken from Dawtry (1980).

Many of the people, especially Igbo and Idoma, who lived on land captured by the Igalas were exploited and treated as second class citizens.

For two centuries (c 18th and 19th) the Igala benefited considerably from the thriving slave trade on the Niger receiving remuneration for the slaves they captured. The environment created by this trade was one of distrust for there was always the potential threat from those engaged in the slave trade. These fears have remained for longer than one might imagine. Oral historians still remember the days when women collecting water from the river were accompanied by young boys wielding bows and

arrows. These feelings were possibly inherited either from memories of the slave trade or else a fear of being captured for the ritual killings which were prohibited by law in the 1940s. Today fear is still dominant in some Igala towns largely because of their impersonal nature.

Following the abolition of the slave trade the Igala readily accepted offers of alternative legitimate trade from the Europeans (c 1832). In 1841 the British government sent an expedition up the Niger with the objective of making treaties, by whatever means possible, with chiefs along the river. The explorers were insistent that the abolition of slavery be an integral part of such treaties. By 1848, Idah was acknowledged by the Royal Niger Company to be a thriving trading town, the outlet of a huge hinterland to the east. As from the 1850s, peace reigned and trade flourished, with some undulations, for more than a century. The wealth, however, was not shared equally as will be seen in the next paragraph. Some of the methods employed by the main beneficiaries of this trade were often questionable.

The most important trade at the time of the British expedition was the wholesale trade in palm produce - palm kernel in particular. Igalaland contributed greatly to the global development of the industry that benefitted the colonial powers rather than Igala people who had no power to determine the price they were paid for their kernels. For over a hundred years, until the late 1960s, ships and barges were loaded with palm produce from Igalaland and beyond at Idah. From here they were taken across the world especially to Britain. This trade was highly lucrative for the foreign companies even if prices rose and fell as the European needs dictated, especially in times of war. Igala middlemen also gained but not so the women even though palm kernels were the traditional basis for their trading. In spite of these injustices the trade in palm kernels meant there was some money in circulation and its accelerated demise due to the civil war (1967 1970) was a very real blow. Although alternative trade was sought with field crops and other fruit tree products none was as profitable as the oil palm industry; the oil palm that is indigenous to the area. The concentration of the national economy on petroleum products did not help either.

During the Nigerian Civil War the Igalas shared boundaries with Igboland and, because of this, suffered border attacks from both the Federal and Biafran armies. In addition, Igbos in diaspora throughout Nigeria were forced to flee from their homes and businesses abroad to their war torn homeland. The exodus of Igbo traders, tailors, wine tapers, mechanics and carpenters, as well as those in the professional cadre, left a great void in Igala society. The great Onitsha market, the main source of manufactured goods, was within the war zone, so Igalas had little access to the goods they normally used. They in turn lost the main markets for their agricultural produce which were in Igbo towns. The depression that pervaded the scene during this period was tangible and continued for some years after the war ended in January 1970. Igalas did not seem to have the physical, economic, or psychological reserves necessary to sustain themselves. The civil war disrupted life in Nigeria as a whole, but nowhere outside the war zone did the economy disintegrate as badly as in Igalaland and Idomaland, where pre-war Igbo influence was more pronounced than in any other area outside Igboland. Unfortunately, the situation continued for some time after the war ended, leaving the people in a state of depression, and according to some Igalas known to the authors, their self-esteem had suffered a blow. All this naturally had a negative impact on any sense of entrepreneurism within Igalaland. The loss of markets was a significant factor, of course, but the impact of this general sense of depression and lack of confidence within the Igala people cannot be under-estimated.

Even if only briefly described, the foregone illuminates the great diversity of influences that constitute the Igala cultural make up. Throughout long periods, the leadership of the Attah was undisputed and he ruled with absolute authority. This influence under the traditional King, called the Attah (father;), was felt far and wide as he was regarded and treated as a super human being - the god of the Igalas.

No wonder Igalas consider themselves a proud people, a characteristic inherited and retained from these imperialistic times. The authors often heard that Igalas will refuse to take on jobs which they considered menial.

Discussions with Igalas interested in the topic of development in the 1970s and later indicated that this pride can be an obstacle to development. They admitted help was greatly needed at many levels for example in infra-structure and water to mention but a few. However, they also claimed that successful intervention would require tact and patience bearing in mind these ingrained and proud attitudes.

These attitudes coupled with the characteristics that accompany a highly centralised society could and can make work in Igalaland a daunting task. Until quite recently it was possible to experience resistance to change mainly through male elder control of and the tight reins they kept on all activities ensuring strict adherence to tradition. This affected land ownership and many other customs and also worked against the flourishing of an entrepreneurial spirit. There was not much incentive to stay at home, and those with initiative and ability needed to find a place which gave more scope for their energy. It is not too surprising that male outward migration became the norm. But times have changed since the 1970s thanks mainly to new infrastructure, wide spread education, improved communication – the radio put communities in touch with the wider world. Chat shows are interesting as many more senior citizens listen to them resulting in a catalytical effect that makes them more open to change; the art of storytelling has encouraged some diehards to appreciate different approaches to life in the wider world. Cell phones have transformed many societies in the African continent as a whole and Igalaland is no exception. The entrepreneurial spirit, especially in agriculture, has begun to pierce the barriers noted above and that story will be explored in the next section.

5.4 Potential for Agricultural Entrepreneurship in Igalaland

The historical importance of the oil palm trade was noted in the previous section and which still remains important to this day. However, while oil palm is important the chief source of livelihood in Igalaland is agriculture, and Igalas are predominantly arable farmers with an average holding of approximately two hectares although much of this will be in fallow in any one year. Cropping systems are complex, with marked differences between the major soil types and between areas of high and low population density. The systems are generally based on bush fallow, with fallow periods ranging from zero to 10 years or more. The length of the growing season (approximately six months) allows for two distinct cropping periods, an early and a late season. A wide variety of crops, annual and perennial, are cultivated. Some keep livestock such as goats, sheep, chickens and ducks as a secondary activity. Livestock are often allowed to roam freely around the compounds, except in areas of high population density where the larger animals are fenced in during the growing season to prevent crop damage.

Apart from some open cast coal mining in the Ankpa Local Government Area that has now closed and timber companies in Dekina and Idah, there are no other significant industries in Igalaland. The steel industry in Ajaokuta, Kogi State, employs some Igalas. There are, however, many small scale businesses revolving around trades such as carpentry, block building and tailoring. Service industries, such as vehicle maintenance, transport, water supply and retailing, are also important, especially in the major towns, and of course there are many shops. One person may engage in a number of activities such as retail, repair services, carpentry and tailoring. Farmers are often involved in a number

of 'off farm' activities such as fishing, milling and maintenance in many forms including repair of agricultural implements and equipment such as sprayers.

Most trades have a direct connection to agriculture. The sale of food made from local farm produce was always important for women. Bean cakes and healthy snacks are made at home and sold to pupils and students in schools and colleges; there is always a demand from travellers for breakfasts and various types of snacks in the motor parks and markets. Currently many people in employment e.g. civil servants, teachers and nurses frequently engage in farming in their spare time not only to supplement their earnings but also to ensure a supply of food for their household when food is scarce and not available in local markets. For this reason, households are becoming more aware of the need to budget and to have food of their own when market prices are high.

Trading is the domain of women. Many women are traders in locally produced farm products, a fact that is often overlooked because of the impression that trade in Igalaland is dominated by the Igbos. Women play a critical role in entrepreneurship with agriculture equally critical to their enterprises.

Given the importance of agriculture to livelihood in Igalaland there is an innate desire to improvise and try out new ideas. Farmers will readily try new technologies once they can 'see it for eye' (i.e. see it for themselves) and while they may not adopt all that they see they may well adapt it in some way. The highly hierarchical nature of Igala society has traditionally been something of an obstacle as the approval of elders has to be sough before a village will welcome visitors and allow new ideas to be demonstrated. But on the other side of the coin provided the protocols are handled correctly this can be an advantage as the backing of such elders can provide a significant boost to those wishing to promote new ideas. If an idea is not adopted by the people then more often or not there are good grounds for this although they may not be immediately obvious to the outsider. For example, a new crop variety may have excellent agronomic attributes in relation to yield etc. but may not be easily processed or perhaps may not taste as 'sweet' (i.e. nice) as other varieties. However, one of the major limitations to agricultural entrepreneurship is the availability of financial capital. Any new ideas have to be balanced against the cost of implementation, and households are understandably anxious to make sure that these costs are not detrimental to their livelihood over the short to medium term. Having an idea that may bear fruit in 10 years' time but in the meantime result in a serious diminution of the household livelihood is likely not to be welcome. But households by themselves have a limited capital base to support their livelihood and try out new ideas. It is here that indigenous self-help institutions have provided an important role.

5.5 Local indigenous self – help institutions with a potential to help entrepreneurship.

There were no commercial banks in Igalaland in 1970; the nearest bank – Barclays - was in Lokoja which entailed a journey of over 100 kilometres from Idah over bad roads and an erratic ferry crossing each way. Barclays Bank first opened in Idah in 1972. However, people managed without such an institution and up to 1970 and beyond looked at their traditional institutions as the only means of accumulating financial capital.

An important primary and self – help group in Igalaland is the Oja. It can be described as the traditional weekly meeting of a community group on an entirely voluntary basis; it is essentially a self-help initiative which encouraged and still encourages group savings on a regular basis. The rules differ slightly from group to group and in some cases members of such groups pay an annual membership fee. These institutions operate at village level and were and continue to be an important means of helping the members with capital accumulation especially before the advent of commercial banks. In

rural areas these groups comprise the adult population, but in the urban centres youth who engage in labour tasks may also be in an Oja. The Igala Oja is very similar to other Nigerian informal Financial Services. Each member of the Oja makes a standard weekly contribution which is equal for all members. Members in turn receive an amount equal to the sum of all the savings for a week, less the cost of the entertainment and refreshments for the group for that day. But the Oja is not just about financial capital. People use these as opportunities to discuss ideas and they can also provide the basis for other support. Indeed, various other community responsibilities are discussed at Oja meetings.

All Oja members would have the same concerns for their community a good example being the provision of water. Its traditional welfare system addresses at least the immediate needs of members who have suffered loss or bereavement. For this all members subscribe on a weekly basis and records are kept.

Besides traditional financial groups there are also tradition labour groups. The most common is the Adakpo (also known as Ayilo and Owe). In common with indigenous societies everywhere, the Adakpo conferred on Igala a very special system of its own. A certain interdependence always existed amongst its members, with each person accepting some responsibility for the overall well-being of the community. An example would be in relation to farming when members made sure that no one was left in the lurch and this was a way of extending a helping hand to those in need.

In some places there were female Adakpo which consisted of wives, relatives, neighbours and friends from the same area. In the central part of Igala women by tradition are protected from 'exploitation' in the form of heavy farm work. However, until recently they were only allowed to own small farms and gardens where they mainly grow vegetables and some crops. Instead they concentrated on providing harvesting (for some crops) and post-harvest activities such as food processing, cooking and the sale of surplus food in the markets, for the farms of their menfolk. This division of labour can especially be seen to this day with some crops in particular such as yam. Yam is still very much regarded as a ‘male’ crop and it is the menfolk who do the bulk of the labour especially land preparation, staking, weeding and harvesting. Making baskets and cages for fowl from palm fronds was also part of the off farm activities for women and other compound industries such as the cracking of palm kernels for local sale; the shells was means of curbing erosion in the compound. Grandparents could take care of children while the mothers went about other activities.

As the twentieth century progressed the institution of the Adakpo adapted to the changing values of the society. The introduction, during the colonial regime, of western culture as expressed through education, healthcare, cement and zinc houses and transport facilities had a marked effect on the aspirations of the people. No longer were young men only interested in going to the farm and young women content to stay at home. People realised the power of money, and wanted to acquire it as quickly as possible. They became impatient to wait for their turn in the Oja for their accumulated ‘contribution’ to be made available to them; the rotating labour group turn may not come at the desired time in which case individuals with capital paid for labour when they required farm work to be done.

For those without adequate capital, the Adakpo is still important although members may carry out paid tasks for other farmers which in turn allows them to pay for inputs for their own farms. Its many flexible forms at present assist women in particular and are of great import for the yam entrepreneur initiative that will be discussed later. Women frequently form their own association and this allows them to dispose of their own income.

5.6 Facilitating entrepreneurship: The Diocesan Development Services (DDS).

The Catholic Ecclesiastical authorities in Idah Diocese in 1970 believed that Igalaland was an underprivileged area, and felt obliged to provide solutions to the many problems that existed, for example poor infrastructure, especially water, roads, culverts and bridges. As noted above the lack of such infrastructure was a significant obstacle to progress at the time. A social scientist was recruited in the 1970 as it was felt that professional skills were required for a more complete analysis of the situation. This was in line with the Catholic Church's recommendations regarding a better understanding of the context in which development was to take place. Such engagement marked a departure from a well-established tradition of involvement in schools, hospitals and evangelisation only. Schools and hospitals have an advantage in that they have an immediate and tangible effect, visible to all who need their services. They can also be organised along the same lines as similar institutions in the western world. Physical and administrative structures were relatively easy to establish, and donors can clearly see the results.

Traditional approaches were challenged by the second Vatican Council (1962 to 1965). This called for an evaluation of the then current role of the Church and its efficacy in the modern world. One of the major outcomes of Vatican II was that it placed emphasis on the Church being relevant to the situation in which it found itself. It is not too surprising that agriculture found a place in the new Church ministries that emerged in the wake of this council especially as many third world countries have large populations, most of which are small farmers. While Vatican II did not specifically mention the need to foster entrepreneurship amongst farmers it can be regarded as a logical extension of this desire to foster development within rural communities.

Before Vatican II the involvement of the Church in agriculture had been almost accidental. The monks contributed to the evolution of agriculture and agricultural science (e.g. Gregor Mendal, the father of genetics). Monasteries always had farms, and through improvement of this farm land monasteries in particular contributed to agricultural development and to feeding the poor. Training in agriculture was often included as part of these education programmes and would address practical issues such as marketing and accounting. However, the training would not necessarily include a formal element of what is now regarded as entrepreneurship although there was always an acceptance that good farmers are open to new ideas.

The above shows involvement of the Church in agriculture predated Vatican II, but it certainly achieved greater prominence in the 1970s, when it became an integral part of many Church based development programmes. However, many of these initiatives tended to be centred on a demonstration or even semi commercial farms, perhaps allied to training. There were, and still are, many practical advantages of having an institution at the heart of an intervention. An institution in this sense was typically a tangible structure – a building or farm or both – that could easily be seen and thereby engenders a sense of confidence that something is being learned and results achieved especially if funds that have been allocated for this purpose. Few attempted to develop an outreach component as central to this activity, and even when it was included it generally comprised services to farmers such as machinery hire. An outreach intervention can take a long time to establish, and the delays involved in a gestation period that requires detailed study often makes the preparatory work unacceptable to aid agencies. Outreach programmes are also by their nature quite dispersed geographically making it hard for someone to witness what is being achieved and hence an element of trust is necessary.

5.7 Beginning to promote agricultural entrepreneurship

But where did one begin to foster development in Igalaland? Was a perfect debut possible? A participatory approach was used to find out the needs of people in Igalaland so perhaps it is not too surprising that there was a request from women for the most basic need identified at that time. This first opportunity to make an entry into development then was provided by the women from Ofakagu who had a very definite need and one which was indisputable. Their request was for help with the provision of potable water – a need identified by all and sundry. These women would help themselves in every way possible to raise the required funds to achieve their objective. Where would the money come from? From extra farming - they believed - as this was their only significant source of income. Little did they realise that though their dream would take some time to be realised they were responsible for heralding a major breakthrough in agriculture which reached no less than half a million people over three and a half decades. One could say that this also marked a distinctive opening for community entrepreneurship. They were motivated to 'begin something' or to 'undertake' an innovation (Olutunla, 2001).

These same studies in the early 1970s suggested that Igala farmers required much help with their agriculture, especially the provision of affordable credit at the start of the growing season. Given the right help Igalaland could play an important role in the creation of the Nigerian breadbasket for the country as a whole. This was the remark of the Agricultural Officer for Igalaland in 1971 but like all promises regarding help for potential growth in agriculture the statement did not get any further than the paper on which it was written.

Ofakagu women at least had some vision of the possibilities inherent in improving agriculture which they shared with the male folk. What was encouraging here was the leadership of Alhaji Adamu in Ejule who listened to the women, gave them every encouragement and indeed was responsible for giving the Farmer Council Project the local leadership vital at the time. The following observation by Tobora resonates with the attitude and determination of the women to find a solution to the water problem which was so ably supported by the detached and sincere leadership of a respected community member.

> "*Entrepreneurship is not a science that can be perfectly defined, but rather an amalgamation or medley of art and science, which displays itself with a combination of factors in a range of different settings, contexts, industries, countries and times*." (Tobora, 2015; page 32)

The real challenge revolved around finding how a solution to the problem could be found from within the society rather than imposing one from outside. An intense study of Igala traditional institutions, which has only been summarised in the previous pages, provided some useful direction. This led initially to the formation of a simple savings scheme based upon the Oja, where farmers paid agreed amounts of money into a savings account on a weekly basis. There were some enhancements based on Credit Union guide lines to make the money more secure. The village Ojas are usually very large, so the size had to be adapted to facilitate smaller numbers wishing to form groups for purposes of agricultural finance. The elaborate managerial structure of the Oja was also adapted to suit this need. The farmers called their adaptation of the Oja a Farmer Council (FC). This was a good example of what Mtika (2013; page 8) talks about:

> "*A fundamental aspect of the community entrepreneurship process is that it should plug into the way people make a living*".

Initially, the money was collected in the weekly meetings and accounts kept, often by parish priests and their catechists. The latter were more than happy to provide such a service as they were convinced that the help would enhance their entire 'pastoral activities only approach'. For them this was about the social benefit for the community referred to by Chidiebere et al. (2014). It was not just about money; in this case it helped people believe in themselves once more – belief that there were answers within their own culture and society. Njoku takes this step even further when he says that such an entrepreneurial approach ensures that:

> "*Human values remain sacred and inspire him to serve the society*". Njoku et al. (2014; page 23-24).

The 'him' in this quote can refer to an organisation as well as to an individual entrepreneur -female or male.

In the previous pages it was seen clearly that Igala needed prompt and immediate help to get out of its depressed moral and economic condition following the Civil War and this intervention was giving new life to those who participated. The savings scheme was adapted to provide finance at the beginning of the planting season. But despite the sincere efforts of the members, the capital saved was not sufficient to meet the high costs of land clearance; this called for a new level of creativity and after considerable discussion and negotiation with donors interested in agriculture a credit scheme was organised to augment the shortfalls in the savings.

> "*entrepreneurship is a process of change where innovation is the most vital function of the entrepreneur*." (Schumpeter, 2001)

As the FC project grew in popularity, the farmers began to solicit help for more technical problems such as control of weeds, pests and diseases. This required a more 'full time' organisation to supply agricultural inputs such as new crop varieties, seed dressings and herbicides. Artificial fertilizers were also being introduced in Nigeria at this time (1970 to 1972), and were seen as a useful contribution to areas with poor soil fertility.

Because of the help being requested, groups decided that each FC or a group of FCs needed a 'group' or 'communal' farm. This was an important part of the education programme that materialised as an outcome of requests from FC members themselves, and in effect acted as both a glue to help keep the FC together and also as a demonstration farm. It was possible to have a variety of operations at any one time during the two growing seasons. Some groups had adjacent plots, especially those from the same part of a village, and so attractive were some of these that they were compared by visitors, often experienced scientists, to scenes from a picture book!

> *"…..entrepreneurial development is a disposition to accept new ideas, new methods and making people more interested in present and future than the past*." (Peter and Clark, 1997)

The women however used such plots as a source of fund raising for their water project and were happy to be included in the help and advice given on how to improve income.

The demonstration of community entrepreneurship is an example of an innovation that was self-generating as farmers had through the FCs an example of what they felt was helping them to bring about change at a rate they could accommodate within their own working schedule. The feeling of 'being heard' for the first time gave them confidence. The demonstration farms were mainly a response to varied problems that farmers, over a wide area, presented for solution. One of the earliest requests was for new varieties of crops, especially for maize, legumes (e.g. cowpeas) and tomatoes,

so the demonstration farms were employed for seed multiplication purposes. The farmers concerned were highly motivated, and hence the well maintained plots that captured the attention of visitors.

While acting as a vehicle for multiplication, different husbandry practices, for example mulching and ridging, were demonstrated. Zero tillage was also presented as an option to those who complained about the high cost of labour involved in land preparation (ridging). Two other problems highlighted by farmers were weeds, especially spear grass (*Imperata cylindrica*), and poor soil fertility. The former could be effectively treated with herbicide, and farmers learned the need to cooperate in order to prevent the problem in future as practices such as burning were detrimental to its eradication (burning promotes flowering of the weed). Soil fertility was improved by the use of legume crops in the rotation and also in alleys where crops were planted in between rows of leguminous trees. Where artificial or new inputs were required, DDS helped by subsidising the cost. Scientists and consultants were engaged by DDS to help with the technical input. DDS became aware that one of the shortcomings of an NGO was both the necessity and difficulty of obtaining suitable technical advice and support. In the early 1970s DDS recognised what Creech et al., identified much later namely:

> *"… entrepreneurs have emphasised that they need not only access to skilled people at the local level, but also access to research institutions to help develop and test products and technologies; access to information; access to advisors and mentors who can add value to the enterprise; access to finance, including impact investors; and access to communications channels to promote their success*." (Creech et al., 2014; page 375).

Entrepreneurship took many other forms in that decade between 1970 and 1980. Women in particular wanted help at household level ranging from raising chickens to help with sewing machines and small grinding mills. Self-reliance had always been important within Igala society and besides helping one household financially it also encouraged other women and school leavers without any opportunity to forward their education that they could make a living by noticing a suitable niche in the market. A widow saw that many people were thirsty in the market and just by being given a few cups and a drum of water she made a good income on market days. Women with a sewing machine sewed seams only and that too was a help to many people in the market. The small shop on a table outside the house had soap, washing powder, kola nuts, matches and maggi cubes (soup ingredient like an oxo cube), sugar and salt available in small quantities at a price which every customer knew and which was what the customer could afford. The income from this convenience store made it worthwhile for the entrepreneur/owner to make these items available to the community.

Many improved crop varieties made their way into Igalaland through the farms owned and run by the FC members. Cowpea and soybean in particular were particularly welcome. The flour from the improved cowpea produced much more cakes than did that of the local variety. They tasted better too and absorbed less oil. Soybean was seen as most nutritious and that led many women to enter this food industry producing soya milk and may other by- products from this crop. But new varieties of other crops were also introduced, especially for maize, rice, groundnuts, sweet potato and cassava. A notable absentee from this list is yam, largely because at that time there were no 'improved' varieties available but also because there were already many local varieties of the crop in existence and farmers already had a lot of choice. Discussions with farmers in yam growing areas suggested that they had much knowledge of the characteristics of the varieties of which they were aware.

Women often rented an orange tree from a farmer for a season and paid a moderate price for the rental. It suited both the farmer and the renter to engage in such a transaction.

Men likewise engaged in repair services of sprayers and wheelbarrows that were making their appearance with improved agriculture; it was vital to have these in good order for besides doing spraying on their own farms they also offered a spraying service to the community.

There were also numerous requests to help improve the oil palm industry and such help was provided. The potential for economic trees was also explored as well as for fast growing trees that would provide fire wood as well as fixing nitrogen in the soil. This intervention was also with an eye to entrepreneurship in the future.

Mtika (2013; page 3) sums up what had happened over a decade (1970 to 1980) in Igalaland – even if only a microcosm – 1.5% of the population of Nigeria – it shows that development from within and based on what people know is lasting and enduring.

> "*A main feature of this type [community] of entrepreneurship is its endogeneity, that is, (i) its focus on building entrepreneurial knowledge, skills, and capacity within communities and (ii) its goal of propagating innovative, inventive, creative, and environmentally responsible behaviour among community members in their production and consumption activities. This does not side line the profit-making motif pursued by marginalist economics but integrates that motif into the central goal of spreading the wealth among the masses*." Mtika (2013; page 3).

There were disputes and occasional misunderstandings; the hardliners were there to ask questions as to what business the Church was having in agriculture and who would gain from this involvement. Suffice it to say here that the difficulties that were highlighted initially regarding how proud Igalas were and often how reluctant they were to engage with change in a highly patriarchal society did not pose too serious a problem. This can be attributed to the advisory body set up by the diocese and the full participation of parishes in advising DDS regarding appropriate action and responses to needs and to any problem that emerged. There were mentors especially Chief Okwoli and mention has been made of local champions like Alhaji Adamu who were always to the fore. The chiefs were always cooperative and their cooperation could be relied upon on most occasions, and in a hierarchical society they have much influence. Educated and resourceful Igala community served the Diocesan Development Board always on a voluntary basis. It is obvious that any misunderstandings are best resolved from within. The biggest criticism from evaluations done at that time was what appeared to be the preponderance of male elders at all meetings. But with time that too changed as did the participation of women.

5.8 The Oil Boom. Another phase in Nigeria and Igala history and economy

But an oft-quoted phrase is that no condition is permanent in Nigeria and a full decade of recovery was succeeded by another decade when Nigerian's fortunes changed. The oil boom in the late 1970 and the early 1980s saw Nigeria enjoy massive wealth; the Nigeria currency was on a par with foreign currencies which led to an increase in imported goods. No Nigerian manufacturer could compete with imported products. It did not pay farmers to farm as imported foods were cheaper to buy than produce. This was made possible because employment was available for labourers in road construction within Igala and outside. For the first time people enjoyed paid employment and for little effort. It was incumbent on companies to employ a certain number of people regardless of whether there was appropriate work available. Igalaland also saw the establishment of a World Bank project during the late 1970s to early 1980s designed to promote agricultural development in the area and

this gave employment to security men and many types of labour opportunities were on offer in Igalaland. Job opportunity was very much the name of the game.

Education was free and instead of engaging in farm work or trading as they had hitherto done, mothers and grandmothers went back to school and were often in the same class as their children and grandchildren. The country was ill prepared to deal with the affluent situation and maximise benefits. Men married extra wives and there was a population explosion.

But the situation did not last. A slump in the demand for petroleum meant Nigeria's fortunes took a rapid change for the worst. The currency was seriously devalued. Worse still was the fact that educated people in their prime, the new class created by education and committed to the wellbeing of their communities lost their jobs. A generation of young people was unemployed. People who had known prosperity and what it was to have money now faced a new kind of poverty. Government ministries became irrelevant since they had lost both their staff and their resources. The slogan at the time was 'back to the land.' This was more by default than from conviction. The farm became the last resort. Changes taking place in the Nigerian economy are always reflected in Igalaland, especially as any deficit in income has to be compensated by some other means of filling gaps in their finances. Any upturn in the economy of the family and the country would have to be from some form of self – employment and entrepreneurship.

The ban on certain food imports greatly influenced the local economy, and women have benefited. Soap making became a very important small-scale industry. A range of products including washing powder and local candles were produced marking a return to the concept of self-reliance which was the hall-mark of the economy half a century earlier. The concept of self- reliance may not all be of happy memory as it could still be connected to a past intervention inspired to make the colonial service to make the local colonial administration self- reliant. However, within Igala tradition the same notion is dominant and practiced to some extent in almost every household. Milling became an important business as a post-harvest intervention but small scale businesses but there was everywhere a reluctance to engage any form of a business plan however simple. Cassava processing machines were introduced and welcomed but little or no provision for ever made for depreciation of the machinery or equipment. Rice mills did a little better but by and large it was a stone wall situation when this type of accounting was introduced.

However as more educated people joined the ranks of the unemployed and wishing to engage in some form of entrepreneurship and self – help, the concept became less daunting. The importance of budgeting took on more import as people realised that income had to be planned and expenditure controlled. Business plans were introduced and those with an interest realised that this was not rocket science- it was more a case of discipline and personal responsibility.

In this period only a relatively small number engaged with yam as a means of supplementing their income. Planting material for the crop was (and still is) very expensive and there are risks involved as the crop could be devastated by drought, flooding or perhaps by human factors such as the migratory Fulani herdsmen and their cattle. Yam was available at a good price in the more remote areas that had excellent conditions for the crop but the problem was the high transport costs. DDS assisted with transport when it was possible and convenient to do so and this was the only way the women who carried out this business could make any worthwhile profit.

5.9 Yam Entrepreneurship in Igalaland

Where did yam fit into the picture one might ask at this point? By 1970 yam was regarded as the staple food that provided the bulk of the energy for households; cassava was a substitute but not a very welcome one. There was great concern as yam became less available especially the most popular varieties. This was particularly true when many of the varieties grown traditionally in what is known as the plateau area of Igalaland were dying. The decline of the yam crop, especially in the plateau area of Igalaland, was due to two main factors. Firstly, the rise in population density saw a gradual decline in fallow periods as land was sub-divided. Yam is a crop that needs to have good soil fertility so as land became more intensively cultivated then the conditions necessary for production decline. Secondly the farmers had an alternative crop that could take the place of yam – cassava. Cassava is a very easy crop to grow, has cheap and readily available planting material (sticks) and can do well even on relatively poor soils. Cassava can also be intercropped very easily with a wide variety of other crops. The problems with cassava are largely related to the high cyanide content of the tubers of some varieties which means that they have to be processed very carefully, and its relatively low nutritional value compared to yam. Given the choice then farmers would much prefer to grow yam but under the circumstances of increasing cultivation intensity then cassava is an excellent alternative. But there were other factors at play as well, including the complete absence of any formal help from the Ministry of Agriculture and Natural Resources (MANR). Help was sought from the International Institute of Tropical Agriculture (IITA) in Ibadan since the mid-1970s. Yam was always on the agenda but this particular issue was not their major concern and much of their research emphasis was on cassava. Indeed, during the 1970s and 1980s IITA produced a number of excellent cassava varieties having resistance to a wide variety of pests and diseases that proved to be very popular with Igala farmers. Many of the new varieties also had a low cyanide content which helped with the post-harvest processing. At this time DDS witnessed something of a boom in interest amongst Igala farmers for cassava varieties and had to experiment with various ways of speeding up multiplication of the limited material (sometimes just a few sticks) it was often supplied with by IITA. But while IITA were heavily involved in cassava research this contact eventually led to DDS becoming involved the Yam Minisett Technique (YMT) and this methodology was promoted in the training of farmers at the DDS Seed Multiplication Farm in Iyegu near Idah during the early 1980s; indeed, it is likely that some of the very first efforts to promote the YMT in Nigeria took place in Igalaland. The history of the YMT is well documented and there is general agreement that in its original form it was not a major success. While it is founded upon indigenous methods practised in parts of south eastern Nigeria over centuries the YMT encompassed a set of formal and seemingly inflexible recommendations that simply did not suit the conditions of all farmers. Uptake was poor but DDS continued to use it to teach farmers the methodology. What DDS and MSHR later learned was that this experience stimulated interest in the production of healthy seed yam among some young budding entrepreneurs trained at Iyegu. They enter the picture later.

DDS's interest in promoting yam as the premier crop became known to DFID and the first cooperation was a research project on yam storage in Igalaland funded by DFID and Irish Aid. This happened in 1993 and 1994 and resulted in a number of interesting insights regarding the important fungal pathogens in storage and the role of damage to the skin of the tuber as an entry point for pathogens. Many farmers around Idah and its environs were involved in this research and the importance of storage and the selection of healthy yams to be used for planting gained prominence in the minds of many. Careful harvesting was also highlighted as yams damaged in harvesting were prone to disease in storage. Believe it or not some farmers remembered this when discussing spacing for the AYMT project many years later. They decided that 50cm spacing gave the sett the chance to develop better in the ground and also ensured that distance was required to ensure no damage at harvesting.

DFID interest continued and research was done into the constraints to yam production in general. One major constraint was the high cost of planting material and the interest charged by money lenders on loans to buy planting material from distant markets. The cost of planting material was high because there was always a scarcity of good quality material mainly as farmers had to travel long distances to source their material. The markets traditionally frequented were Illushi, Katsina Ala and Lafia. The transport costs drove up prices and the long distances did not often help the quality of the yam. The obvious solution was to produce healthy seed yams locally in Igalaland, and in order to help achieve this two important pieces of research were undertaken. The first was to get a better comprehension of how yam planting material fitted with the household and livelihood capitals; the second was an opportunity for DDS to participate in another DFID sponsored project in 2002 and 2003 to look at different methods of producing seed yams based upon YMT but adapting it by using a larger sett size and more effective ways of applying pesticide treatment to the setts. Four different treatments were used and the one that gave best results was a cocktail dip that penetrated the sett and which had a more lasting effect. The original form of the YMT utilised pesticide dusts that were spread on the surface but which had limited penetration into the flesh of the setts. These results using a larger sett size and the cocktail dip was tested in two villages – in Edeke close to Idah - and Ekwuloku a village close to the Igbo border, Enugu state in Eastern Nigeria – and proved to be very successful. This new approach formed the basis of what became known as the 'Adaptive Yam Minisett Technique (AYMT). Unlike its predecessor the AYMT does not promote a single recommended sett size for all circumstances but a range of sizes that farmers can adapt to suit their local conditions and requirements. Also, because the AYMT uses larger sett sizes than YMT there is no need for a nursery stage and the material can be directly planted in the field, saving labour and wastage of planting material. The latter is addressed by the use of the pesticide dip which helps with sett survival and tuber growth.

The old minisett technique had been taught to a trainee farmer from Ekwuloku at the Seed Multiplication Farm close to Idah some years previously and though he never quite adapted the technique himself he talked much about it to his friends and neighbours. Instead he had become a seed yam trader and welcomed the possibility of improvements in this technique. He was actively involved in encouraging participants to get involved and served as an ambassador for DDS in promoting it. MSHR did not have the time to return there to see if he is an adopter but he certainly was a promoter.

The next opportunity to work with the YMT was again afforded by DFID when in 2009 DDS was invited to participate in the production of healthy and clean seed yam. Members of communities had time to reflect on the advantages or otherwise of producing clean seed yam over the intervening years. After much discussion Edeke and Ekwuloku accepted to be part of the intervention where the advantage and potential for healthy seed yam production, especially in terms of its economics, would be further studied and researched. The emphasis here on economics is an important one. While it was known that the AYMT 'worked' in an agronomic sense it was important to explore its economic viability under 'farmer managed' conditions. Ironically the idea of producing seed yam, practical as it may seem, did not meet with wild enthusiasm. A more adequate supply of high quality seed yam was badly needed, they were doing this to a limited extent already on their own – so why was it so difficult to take that practical step and become self-sufficient through satisfying their own requirements? As Mtika points out entrepreneurship is not only about innovation and doing 'new' things, there is also an element of risk:

> "*Entrepreneurs are individuals who engage in some risk-taking behaviour in investing resources to achieve a goal*." Mtika (2013).

The risks envisaged envisioned were studied and great attention given to what could possibly go wrong with the project and the possible impact of this on their income and supply of planting material for the coming year. Yams are expensive so if something goes wrong then all of the investment in terms of money and time spent planting the setts would be lost and this is a very significant cost indeed. Cassava is a much cheaper alternative to yam as cassava sticks cost next to nothing and are easily prepared and planted; it is no surprise then why so many farmers moved away from yam and into cassava cultivation. A solution was found to this as the initial supply of planting material would be supplied free of charge to participants. A certain sum was supplied for the extra labour required to engage with the seed yam production even if it took place a few weeks later than did ware yam planting. This sum covered clearing, land preparation and weeding; more importantly it mitigated any risk in relation to farmers having to borrow money for operations that may not give them a return on their investment. There was never a question or suggestion to participants that seed yam would ever replace ware yam production. Seed yam production would always be seen as a means to an end and should be complementary to ware yam**.**

Having agreed on these conditions DDS also had an agenda namely that a Business Plan had to be part of the agreement with the participating farmers. Business plans were becoming an integral of such interventions if the enterprise was to be profitable and that profit considered worthwhile. The 'concessions' provided to avoid the concerns over risk were factored in the expenditure section of the business plan. These participants were carefully selected with well-established trust existing between them and DDS.

The process used in bringing this innovation to development is close to what UNIDO describes:

> "*the process of using initiative to transform business concept to new venture, diversify existing venture or enterprise to high growing venture potentials*" (UNIDO, 1999)

DDS recognised the need to train farmers in the extra work now required and more especially how to make a business plan work to their benefit rather than a type of penalty attached for the privilege of participating. Thought patterns had to be changed and what could be called inertia had to be overcome; this is another discipline required to overcome the cycle of poverty.

This is as challenging for those introducing the change as it is for those wishing to break that vicious cycle of poverty; self-discipline is a must but it is now becoming clear that once such behaviour becomes the norm it greatly contributes to a change in fortunes. However, there is a warning here: this will take time and outcomes will be as incremental as they were in the early days of agricultural development between 1970 and 1980. But DDS learned that a solid foundation once laid is enduring and essential to sustainability.

> "*Entrepreneurship can be defined as a specialised knowledge that entails teaching learners the skills of risk-taking, innovation arbitrage and co-ordination of factors of production in the creation of a new products or service for new and existing users in human society for economic ends*." (Towobola et al., 2014; page 74.

The years 2010 and 2011 were huge learning curves for DDS. The experiences during this time were shared with 'neighbours' beyond the bounds of Igalaland especially in Idoma and Tivland. These were always part of the DDS concern about agriculture and the introduction of yam in a formal manner on to the crop menu was a cause of untold excitement. The agronomic details of the AYMT are not spelt out in this section as they are already available in this paper and in other publications. The thrust here is on uptake and the spread of the AYMT to other places beyond Igalaland. A really interesting feature of this expansion of and demand for the AYMT is that it has taken the same 'route' as did the Igala

kingdom some hundreds of years ago extending as it once did to Koton Karifi in the north, to the Nsukka area, in Enugu State in the south, eastward to Idomaland and westwards across the Niger river to the present day Etsako local government area of Edo State. Apart from Koton Karifi these are places where the demand for the AYMT is most encouraging. Of course it has also spread to Tivland and the Federal Capital Territory.

The YIIFSWA project was launched in late 2011 and the authors, both of whom had a long involvement with DDS, were invited to participate. They were asked to especially engage in two aspects of the newly approved project:

1. To help promote the AYMT to farmers in a number of the key yam growing areas of Nigeria
2. To establish a number of farmers as seed yam entrepreneurs.

This mandate to go beyond the ecclesiastical borders of Idah Diocese did raise a number of questions. While not in itself a problem given that both had worked in Nigeria for many years and had links to a variety of organisations, it did mean that DDS could not provide the umbrella. Instead it was decided to manage this form of engagement under the umbrella of the Missionary Sisters of the Holy Rosary (MSHR). DDS was created and managed by members of the MSHR but as a diocesan institution it only had a remit within the Diocese of Idah. But MSHR has a global outreach and as such can work in any place where it is invited. At the time of writing MSHR is working in nine countries in Africa (Sierra Leone, Ghana, Nigeria, Liberia, Cameroon, Ethiopia, Kenya, Zambia and South Africa) and two in Latin America (Brazil and Mexico). MSHR was happy and ready to participate in the YIIFSWA project when it was launched in late 2011. It had three years of experience with the AYMT via its work with DDS not to mention the decades of foundation laying where something new – mainly the commercial potential - could be embedded.

As noted above, in the YIIFSWA project MSHR was responsible for demonstrating the AYMT and for the introducing entrepreneurs into the projects bearing the aforementioned in mind. In an effort to make the product – the AYMT- more available to ware yam growers – MSHR continued the work with business planning adapting it to both agronomic requirements as well getting the participating farmers attuned to thinking realistically about returns on their investment. MSHR was fully aware that medium and small scale businesses have not been very successful in Nigeria and as Chidiebere et al. (2014; page 21) point out a successful business needs to "*…assess[ing] its role (AYMT) on economic growth and development. Tapping the country's resources require the ability to identify potentially useful and economically viable fields of endeavours…..*"

One of the first considerations when addressing the issue of commercialisation of the AYMT was to ascertain if it had the 'ability to be potentially useful and economically viable and why had traders not done this before? Initial research showed that there was only one seed yam trader in Idah market – he was a male and not very well known.

Research continued and suffice it to say MSHR has gained much more useful data not just for Igalaland but also for other yam growing areas of Nigeria where it is working with YIIFSWA. At the time of writing the work continues but by now it has become apparent that there are female and male seed yam traders in Idah; they seem to have formalised a rather informal but efficient system of working together. A major breakthrough was when it was discovered that one of the male entrepreneurs in the YIIFSWA project was a member of the Union of Yam Traders in Idah. Meetings have been taking place with these yam traders since mid-2015 and it appears there are up 100 members in this Union.

Through a series of meetings with some of these members MSHR learned about the seven varieties of yam in which they trade and this is in both h seed and ware yam. These are Uga, Ekpe, Oboko,

Mumuye, Ameh, Awala and Ugbetulugo. Their source of Ugbe and Epke is the village of Illushi; the rest come from Zaka Biam. They believe that Oboko, Mummuye, Ameh, Awala and Ugbetulugo give the best income. All would be delighted if seed yam would be grown locally and all for practical reasons especially avoidance of dangerous travel, the excessive cost of travel itself plus the expenses involved in loading and reloading the tubers. Loading and reloading is costly and travelling long distances does not help the yam especially seeds.

They know exactly how the different markets arrange sale of produce as it is differently in the different areas; Kpe and Uga varieties are sold in Illushi in heaps of 400 seed yams while Zaka Biam sells in heaps of 100. Every trader grows a certain amount of seed and ware yam but they are interested in AYMT because of what they have learned about it from talking with producers. The women pleaded for training in this method. As of September 2015 every trader sells at least 100,000 seed yam per annum and could sell much more so great is the demand for healthy seed yam. Overall there is a shortage of seed yam; but generally they have sufficient ware yam with which to trade even as late as May each year. All traders are involved in the production of both seed ad ware yam and to accomplish this they rely on their contribution system (rotational savings scheme) which is a great support for their farming enterprises; but often the date for collecting their contribution is too late to purchase inputs at the crucial time. Their rotational saving system needs to be made more user friendly if it is to be effective in agriculture – MSHR is speaking from experience.

In the YIIFSWA project MSHR has only worked with three of the varieties in which they trade - Ekpe, Uga and Oboko. Unsurprisingly the yam traders' greatest constraint is a lack of capital but it was explained to them that YIIFSWA does not provide loans but rather trains farmers and yam growers. The initial supply of ware yam for setts used in the AYMT entrepreneur plots were provided by MSHR as part of the YIIFSWA. The plot owner/leader retains the seeds but some seeds are distributed to those who participated in the AYMT training at its many stages. Group members who would have helped with the responsible tasks are also compensated with some seeds – the amount related to the labour they provided.

Women in particular were keen to be part of the YIIFSWA training in 2016; the men too are keen to participate as the demand for improved planting material is not matched by supply. There is a genuine appetite and a will to cooperate amongst traders and farmers to overcome this problem. The added advantage of not having to travel long hazardous journeys to Zaka Biam and Illushi has a huge appeal and regarded by all present; the savings made in time and energy is attractive and the intervention as a whole seen as a means of improving the economy and livelihood conditions.

Many more meetings took place since the initial and more formal one with the Union of Yam Traders in 2015. Sixteen members have expressed the wish to participate in seed yam production in 2016. Their chosen variety is Uga or Alumaco as this variety is also known. There are eight women participants in this first venture. The cultural challenges of women participating in yam production are well understood as it is very much a male crop and women tend to get left behind when it comes to training in the agronomic aspects of seed yam production. This is one of the finding from MSHR's analysis of YIIFSWA over 2012, 2013, 2014 and 2015. Women can own yam plots but the work has to be done by male relatives or hired male labour which can be expensive. It has also to be borne in mind that women entrepreneurs do not seem to get a good deal in Nigeria as Adeola (2015) concluded that:

> *"…….women entrepreneurs face serious challenges which include socio cultural influence, lack of technological advancement, lack of policy for entrepreneurship, corruption, government's attitude towards entrepreneurship, political trends, financial constraints, bank policy and bureaucracy, lack of infrastructural development, low level of education,*

family responsibility, and lack of access to training in their business operation." (Adeola, 2015; pages 377-378).

MSHR is well aware of such constraints and in a series of dialogues with both the women and male participants have once again as with the intervention of the AYMT from 2010 onwards done everything possible to study the risks and together reduce the possibilities of something going wrong. Njoku et al. (2014), listed 17 possible difficulties but not all apply to this intervention with yam traders in Idah and its environs. Those that were applicable such as credit facilities, failure to adapt to the changing business environment, lack of venture capital, cultural restrictions of female entrepreneurs, entrepreneurship often seen as a way to 'get rich quick', poor planning and poor quality of product or service have been discussed and as far as can be ascertained satisfactorily addressed. Each trader received 2000 treated setts in 2016, and taught every aspect of the treatment of setts. A business plan continues to be part of the training. The problems of achieving the required quality seed yams has been discussed and satisfactory arrangements were put in train for ensuring that the agronomic practices were of the standard required for this. What is provided is not a panacea and women realise that discipline is required if they are to achieve their desired outcome.

All participants in the 2016 programme are members of the Union of Yam traders in Idah and operate the Oja system of contributions on a weekly basis. Not many get their turn on time to be able to buy seed early enough for either seed or ware yam planting. If lessons from the past are applied, it may be possible to adapt their Oja in the same way as was done with the FCs in Igalaland in the early 1970s. They will receive start up material as a once off and that should help them make savings that was not possible for them previously. But it is a case of one step at the time as all patiently await what unfolds.

6. Seed yam entrepreneurship in the YIIFSWA project

The initial contract that MSHR had within the YIIFSWA project stated that 10 seed yam entrepreneurs had to be identified, trained and supported each year. It was not clear whether 10 new entrepreneurs had to be found each year or whether this figure refers to the same farmers that could be identified in year one. MSHR began with a flexible view on this and wished to test the waters, so to speak, before making concrete decisions. The number of entrepreneurs (male and female) established between 2012 and 2015 are shown in Table 3.

Table 3. Number of entrepreneurs established along with the number of seed yam plots that were planted each year.

Year	**Number of Farmers**	Number of farmers		**Number of sites harvested**	Notes
		Male	Female		
2012	**6**	6	0	**4**	All farmers had one plot 2 plots lost to flood
2013	**9**	9	0	**12**	3 farmers had 2 plots each The remaining 6 had one plot each. All plots survived
2014	**20**	15	5	**20**	All farmers had one plot All plots survived
2015	**22**	21	1	**12**	All farmers had one plot 9 plots lost to flood and one had to be abandoned.

A sub-set of three entrepreneurs were involved across all four years, but other than that group the farmers involved changed between 2013 and 2014. It should also be noted that the farmers were predominantly male; only a few female entrepreneurs were included in 2014 and 2015. The reason for this is that in Igala culture yam is a male crop. Women are heavily involved in marketing and traditionally help t with harvesting and transportation to storage, but it is men who do the bulk of the work when it comes to land preparation, planting and staking. While it is not unknown for women to own yam plots they usually pay for men to do the bulk of the fieldwork. Hence it is not surprising that men dominate the numbers in Table 3.

MSHR asked the participating farmers in each year to establish a seed yam plot using the AYMT technique, with the majority of the site planted to treated setts. In every case the farmer was also asked to plant an area to untreated setts so that others could see the benefits of using treated setts. While the plot was owned by the entrepreneur and they were responsible for all management decisions, they were asked to provide training to other farmers. The latter usually took place at two times, first at the time of preparing the planting material and second at the time of harvesting. It should be noted that these plots were not primarily intended for training purposes and in that respect they different from the other 'core demonstration' plots established by MSHR. The dimensions of the entrepreneur plots across the four years are shown in Table 4. In 2012, the first year of the project, the farmers were asked to plant equal areas of treated and untreated setts so that they could observe the benefits of using the pesticide 'dip' for treating the setts. In subsequent years the farmers were asked to devote just one row to untreated setts.

Table 4. Dimensions of the seed yam plots that the entrepreneurs were asked to establish.

Year	Area of treated setts	Area of untreated setts
2012	5 rows of 15 m = 75 m^2	5 rows of 15 m = 75 m^2
2013		
2014	19 rows of 20 m = 380 m^2	1 row of 20 m = 20 m^2
2015		

Management of the plots was entirely left for the farmers. Most of them used a spacing of 30 to 50cm between stands, weeded the crop at least twice (many also used a pre- and post-emergent herbicide) and staked it. Farmer-managed plots provide the best match to the conditions under which seed yams would be grown by these farmers if they continued.

At the beginning of each growing season the participating farmers were identified and the nature of the enterprise was explained to them. They were requested to spend some time with the MSHR staff in charge of the project to complete a business plan. This has a number of key sections as set out in Table 5.

Table 5. Outline of the business plan adopted by MSHR for the seed yam entrepreneurs.

Background information	Name of farmer, gender, place of residence, place of enterprise, variety of yam planted, source of tubers for cutting the setts
Planning	Anticipated inputs required for the enterprise and how much these are likely to cost Anticipated outputs (number of tubers) from the enterprise and what revenue may be expected from selling all of the tubers Anticipated gross margin (revenue – cost) Anticipated challenges that may be encountered and how they can be addressed
Realisation	The actual costs that were incurred in the enterprise The number of tubers harvested and the revenue that was obtained Realised gross margin (revenue – cost) The challenges that did occur during the enterprise and how they were addressed

The idea behind these questions is straightforward. The farmer is invited to think about what he/she is planning to do and the costs and revenues that may be involved. At this point it should become clear if the enterprise will be economically viable in the sense of achieving a positive gross margin. If this is not the case, then the farmer is invited to consider the planned costs and revenues to see if they are realistic. It may be, for example, that the farmer is planning to spend far more on the plot than is necessary. Similarly, if the gross margins appear to be very large then the farmer may be making unrealistic assumptions regarding production and revenue. These assumptions are then compared to the real costs and revenues so the farmer can see where they may have gone wrong in their planning. Allied to all of this is an invitation for the farmer to consider the challenges they may face at the outset of the enterprise and how they think they may be able to address them if they occur. They are also asked to consider the challenges they did face realistically and how they would deal with them. Thus the business plan is a founded upon a central idea in development: action, action and reflection.

In addition to the farmer-facing dimension of the business plan form there are other sections that are meant to help MSHR understand what happened with the plot. Hence there are sections that are completed by the MSHR officer in charge that address:

- Number and weight of tubers harvested. These data are used to calculate the yield and also to provide data to the YIIFSWA management team as part of their evaluation reports.
- Labour record (person-hours per activity). This is a useful check to see how much time has been spent on the plot and it allows for a full costing of labour if so required.
- Record of visits to the site

None of this information is conveyed to the participating farmers.

The business plan further evolved during the lifetime of the YIIFSWA project, largely to help address problems with the farmer-facing element. Completing the anticipated and realised costs and revenue sections proved to be more of a challenge than was thought, as indeed was the notion of a 'gross margin' (revenue – cost). Hence these sections had to be clearly separated and much time was spent training the farmers as to what these concepts meant. It was surprising to the authors how alien is the idea of anticipating costs and revenues to the farmers involved. This justifies one of the major reasons why the same farmers were kept over a number of years rather than change them each year.

A further challenge to the business plan model as outlined above was the reluctance of participating farmers to sell any of their seed yams. They much preferred to keep them and plant next season. Hence while it was possible to record production figures (primarily the number of tubers) it was not possible to provide real revenues and instead these figures had to be imputed based upon estimated market prices. This was also a surprise to the MSHR team and did provide something of a dilemma. On the one hand a central assumption was that the seed yam entrepreneur project was to encourage some farmers to specialise in seed yam production and then sell their produce to the wider yam growing community; as with the 'community entrepreneurship' outlined earlier. Yet the farmers appeared to be reluctant to sell their seed yams and preferred instead to use them to generate ware yams the next year. They were acting as business entrepreneurs rather than social entrepreneurs. Were we too idealistic? It took some time to unravel all this and to understand the reasons why the farmers were doing this. It transpired there were two main reasons at play. Firstly, and as noted earlier, the ware yam crop is the one that provides food and economic security and is the crop that is most prized. The seed yam crop is but a step towards that goal and once the farmers saw the quality of the seed yams that came from their plots their priority was to capitalise on this as much as possible by taking them to ware yams the next season. Seed yams are a highly prized commodity. Secondly there is no seed yam market in the Idah area and consequently there is no chain of traders to help take the produce from the farmer's field to the market with all the required bulking-up, grading etc. that is essential. It is simply much easier for the farmer to keep the seed yams and grow ware yams the next year rather than go to the expense of selling them in local markets. If a value chain could be established that links the seed yam growers with the market, then this view may change and farmers might be more willing to sell their surplus seed yams. With both of these aspects there are 'tipping points' at play. The entrepreneur plots were quite small in size but if the farmers could be encouraged to grow more seed yams then it is likely that they will have excess planting material they would be willing to sell. The value chains will only be possible once there is a viable number of farmers producing seed yams. With only a few farmers producing seed yams then the value chains will not be viable but once this gets to a tipping point then viability is assured.

Having said the above, it has to be noted that there are significant challenges when it comes to recording revenues from farmers. While they are willing to set out their costs and highlight the

difficulties that they face farmers are not usually so keen to share information on their revenues. Thus it is not impossible that at least some of the farmers did sell their seed yams but did not want to disclose the data to MSHR. Nonetheless, the tuber counts are made by MSHR staff and therefore it is possible to impute likely revenues.

Data were analysed using the General Linear Model (GLM) approach to analysis of variance. The detailed results have not been presented here and instead it was decided to present the means of the variables in graphical format, with standard errors.

Figure 14. Heaps of seed yam in Illushi market, Nigeria, along with buyers and sellers.

7. Agronomic and economic results from the seed yam entrepreneur plots

7.1 Germination rate and tuber weights

The average germination rate for the setts across the years 2013, 2014 and 2015 are presented in Figure 16a for these years and treatment. The averages vary between 70% and over 90% and while there are no statistically significant differences between the three years there is a significant difference due to treatment. Treated setts tend to have a higher germination rate than untreated ones ($P<0.001$).

Average tuber weights are shown in Figure 16b for the three years and for untreated and treated setts. There is no discernible trend across the three years but treated setts tend to produce tubers with a higher average weight than do untreated setts ($P<0.001$).

There is no evidence to suggest that the varieties differ in terms of germination rate (Figure 17a) but it is noteworthy that the average tuber weight is higher for Ekpe than Akpaji although this is not quite statistically significant at the 5% level ($P=0.064$; Figure 17b).

7.2 Number of tubers harvest and average tuber weight per sett planted and germinated.

The mean number of tubers harvested and the mean weight of those tubers on a sett planted and germinated basis are shown in Figure 18 for the three years for untreated and treated setts. These data have been re-arranged in Figure 19 to allow a comparison between the two yam varieties.

The data do suggest that for these variables there is a statistically significant difference over the three years. In particular, 2013 had higher values for all of these variables than 2014 and 2015. This may well relate to better growing conditions that year given that the locations of the entrepreneur sites have been much the same over these years. The major influences on these variables come from treatment and variety. Treated setts tend to have higher numbers of tubers per sett planted as well as higher tubers weights compared to untreated setts. However, in terms of the number of tubers per sett germinated there is no significant difference between untreated and treated setts. Thus the causal relationship is a simple one: treated setts enhance the germination rate and this is reflected in terms of the number of tubers per sett planted. Once the sett has germinated the major effect of treatment is upon the weight of tubers that are harvested.

Given these data it is not surprising that the entrepreneurs were very positive about the use of the sett treatment. Interestingly, the effect of sett treatment was to increase average tuber size to around 1 kg, a weight that is too high for the tuber to be used as a seed. This may sound disadvantageous but ironically it makes the system more attractive to farmers as it allows for a range of tubers spanning the seed to ware yam range, and it must be remembered that ware yams are the ones consumed and sold in markets. Thus having a system that generates some ware yams is regarded by the farmers as an advantage and aids sustainability.

Finally, it is also of interest to note that Ekpe tended to do better – in terms of number of tubers per sett and also tuber weight – than Akpaji (or Ugah as it is sometimes called). But while Akpaji has not done as well as Ekpe in the entrepreneur plots farmers hold that Akpaji has a good flavour, tubers cook faster, stores well, has a smooth skin and fast germination, robust tubers and a degree of drought resistant. As a result of these characteristics it would appear that demand for Akpaji is on the increase. This is borne out in one location in 2015 where the entrepreneur plots were all planted to Akpaji;

indeed, not one of them used Ekpe even though this was a hot favourite for many years. Akpaji is now more expensive to plant.

Figure 15. Yam harvesting. This is typically undertaken by a specialist so as to avoid damage to the tubers.

Figure 16. Mean germination rate (A) and mean tuber weight (B) from untreated and treated setts. Error bars are the standard errors.

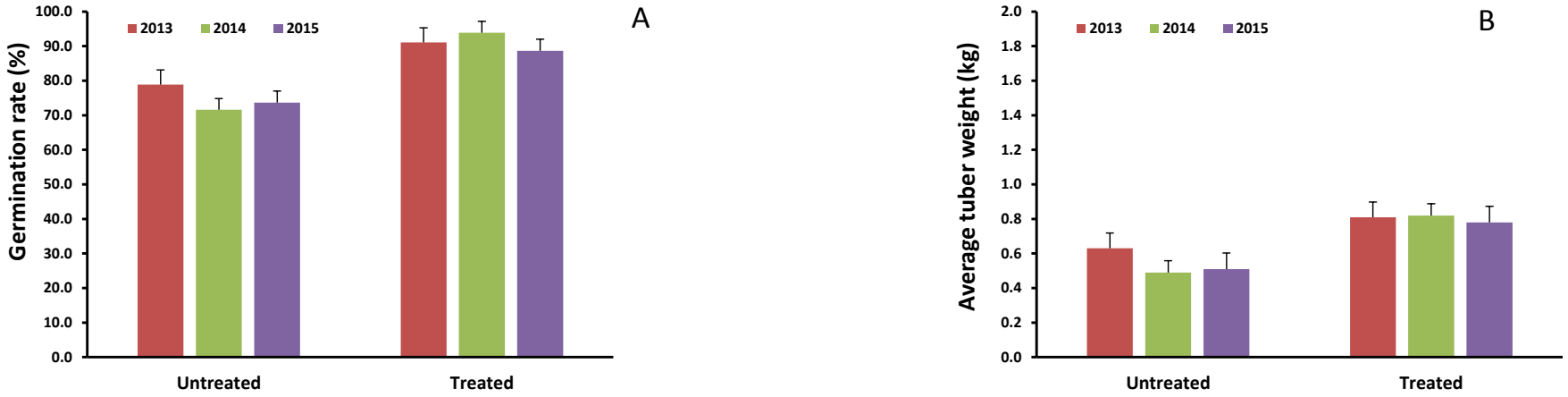
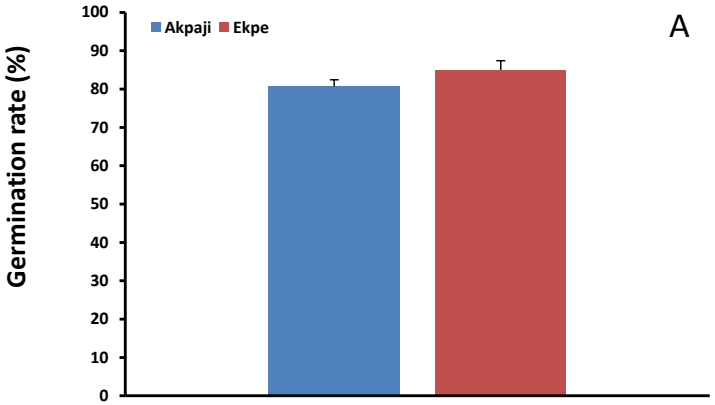


Figure 17. Mean germination rate (A) and tuber weight (B) for the Akpaji and Ekpe yam varieties. The error bars are the standard errors.



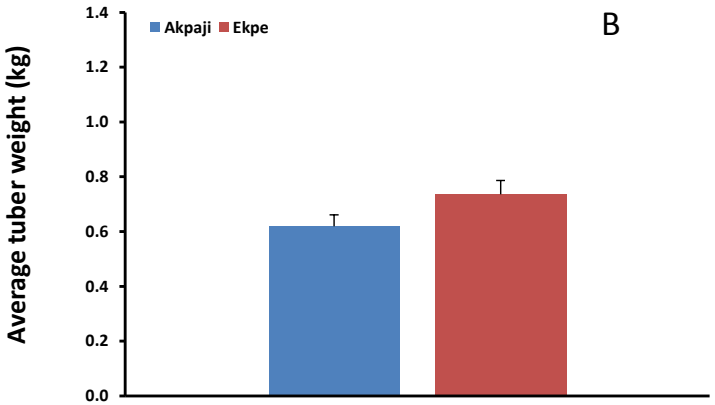
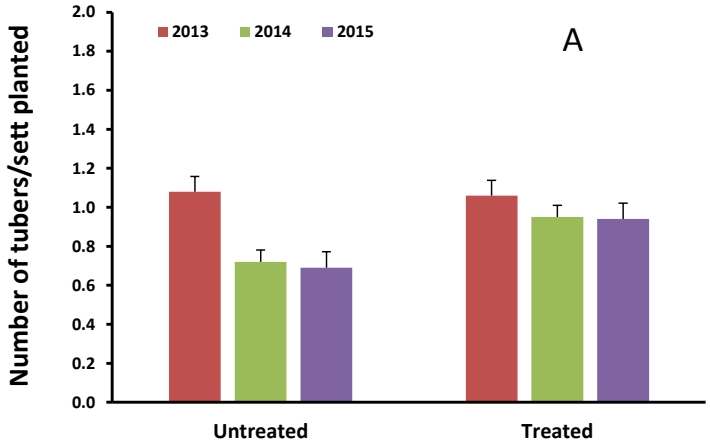
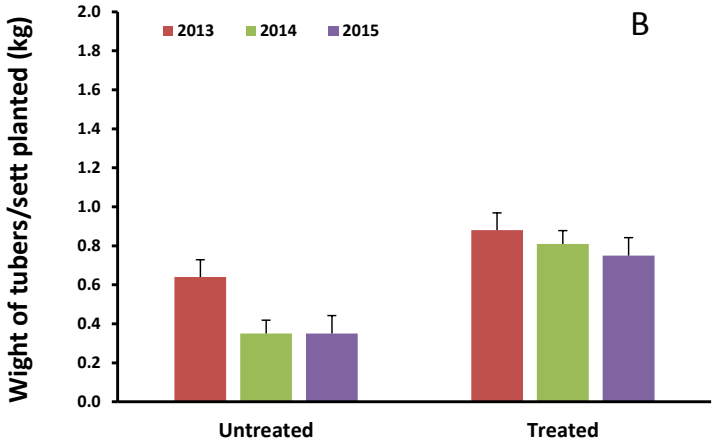
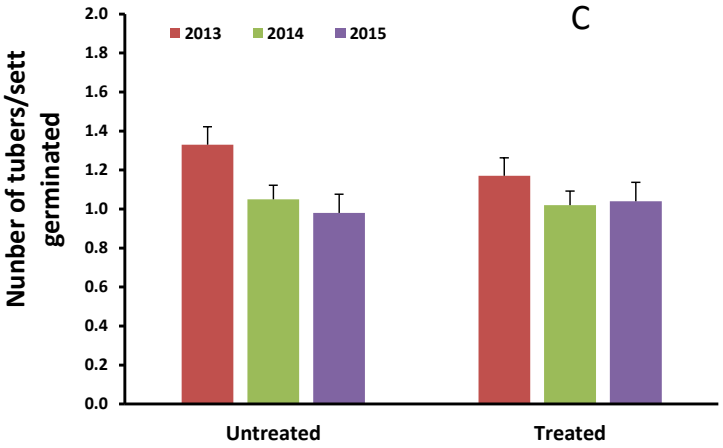


Figure 18. Mean number of tubers per sett planted (A) and germinated (C) along with the mean weight of tubers harvested from planted (B) and germinated (D) setts. Means are for untreated and treated setts and the error bars are the standard errors.







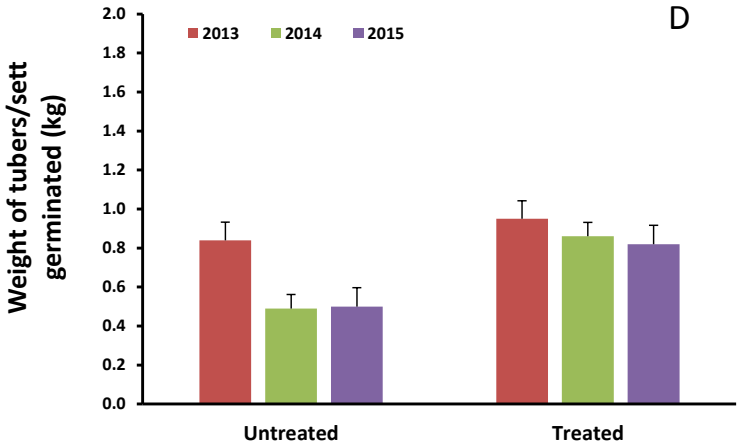
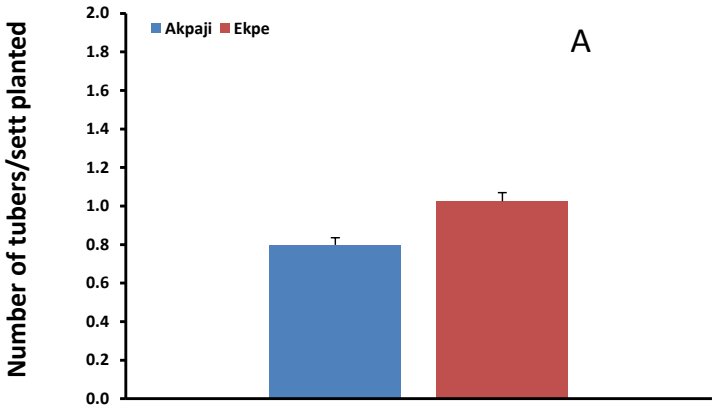
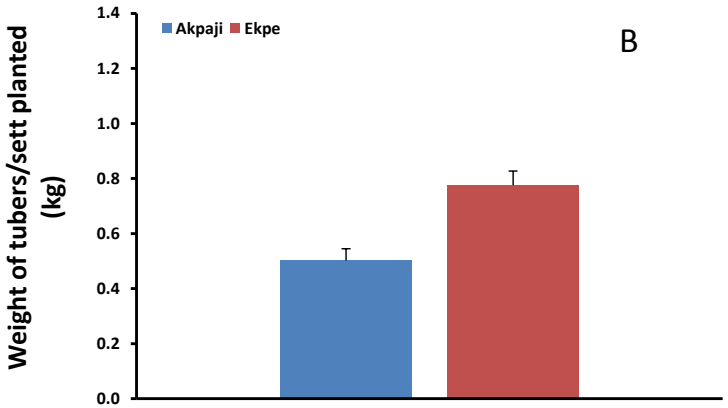
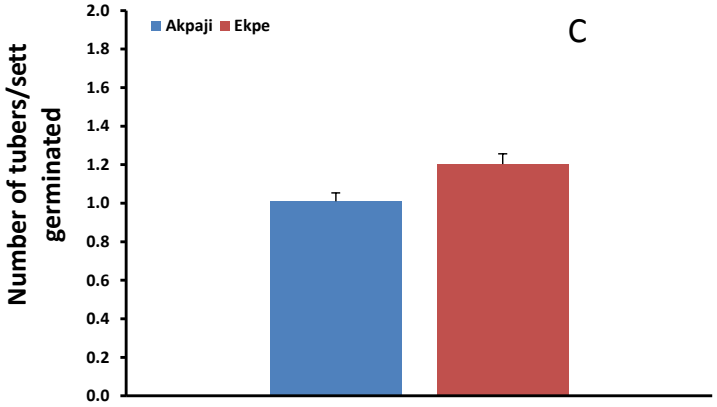
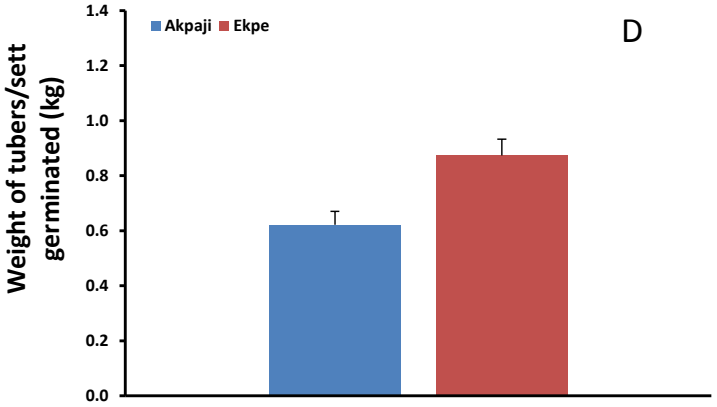


Figure 19. Mean number of tubers per sett planted (A) and germinated (C) as well as the mean weight of tubers harvested per sett planted (B) and germinated (D). The averages are for the Akpaji and Ekpe yam varieties and the error bars are the standard errors.









7.3 Mean costs, revenues and gross margins

The mean costs, revenue, gross margin (cost – revenue) and return on investment (gross margin as a percentage of costs) for the 400m^2 plots are shown in Figures 20a to 20d. Each graph has the expected and realised figures for these variables, although it should be noted that the realised revenues have been imputed based upon the farmer's estimation of a price per tuber. The latter is an important constraint and was necessary because none of the farmers sold their yams.

With regard to costs (Figure 20a) it can be seen that the figures for 2012 are somewhat out of line with the others. This was the first year of the programme and teething problems could be expected, but it should also be noted that the number of farmers involved was small and so was the plot size. Hence some misalignment with the following years would be expected. For the other three years the data suggest that on average farmers had a 'realised' cost of around N15, 000 per plot, and this was typically lower than they anticipated. However, worthy of note is that these costs are high compared to many other field crops grown in the area.

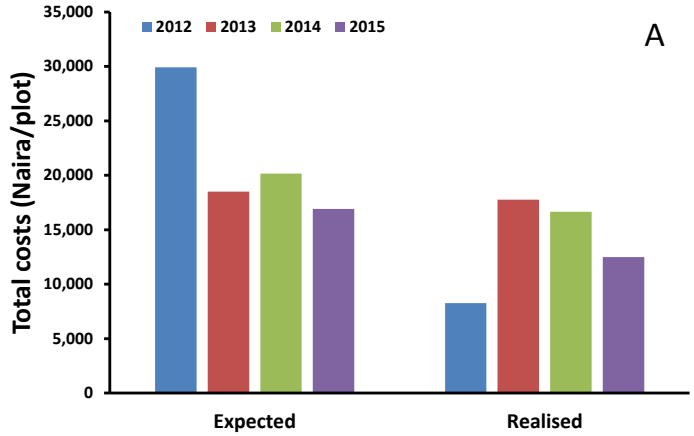
For revenue (Figure 20b) the data suggest that on average farmers could have realised between N80, 000 and N100, 000 per plot. These are significant sums considering that the plot size is just 400m^2.

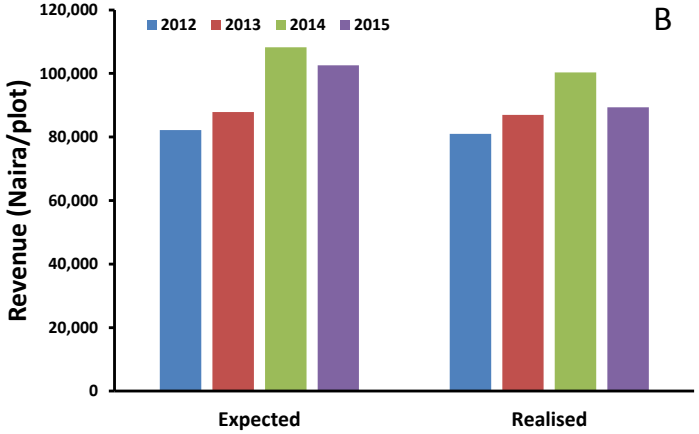
The key figures are, of course, the gross margins, and the averages in Figure 20c are around N70, 000 to N80, 000 per plot.

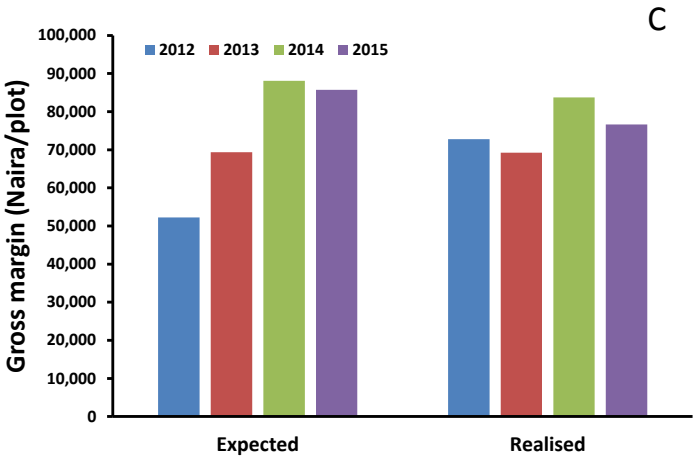
For return on investment (gross margin as a percentage of costs; Figure 20d) the figures suggest a healthy return, typically between 400% and 700%. However, while these figures are, of course, encouraging it should be realised that farmers still have to find the money to establish the plots and costs are relatively high when compared to many other field crops.

These variables – cost, revenue, gross margin and return on investment – can also be re-arranged to explore differences between the two varieties and the results are shown in Figure 21a to 21d. The same limitation applies, of course, in that the figures for revenue are based on imputed estimates of the economic value of the tubers produced. This impacted upon the estimates of gross margin and return on investment variables. Hence the results can only be indicative. Nonetheless it is interesting that the costs, revenue, gross margin and return on investment are all higher for Ekpe compared with Akpaji. To some extent this mirrors the fact that Ekpe tends to have more tubers per sett planted and the weight of the tubers produced is also higher. More yam per plot for Ekpe relative to Akpaji means more revenue. As noted above, an interesting trend observed in 2015 was farmers' preference for Akpaji, largely because it looks like the market for that variety if beginning to expand.

Figure 20. Mean total cost (A), revenue (b), gross margin (C) and return on investment (D). Figures are for both the expected and realised data.







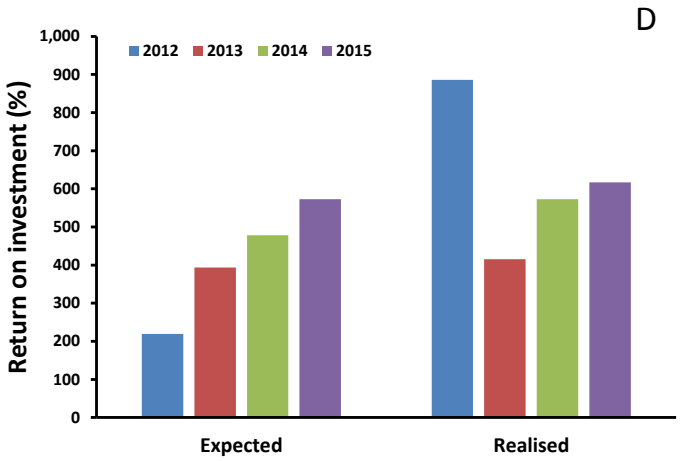
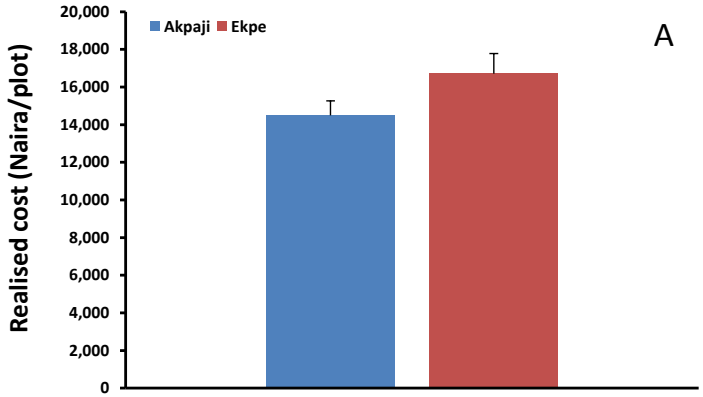
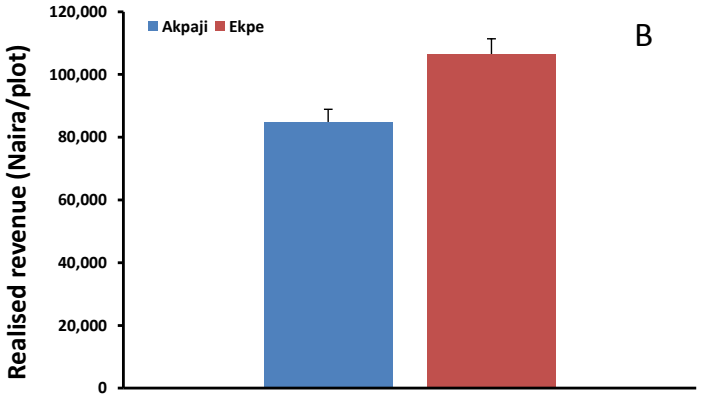
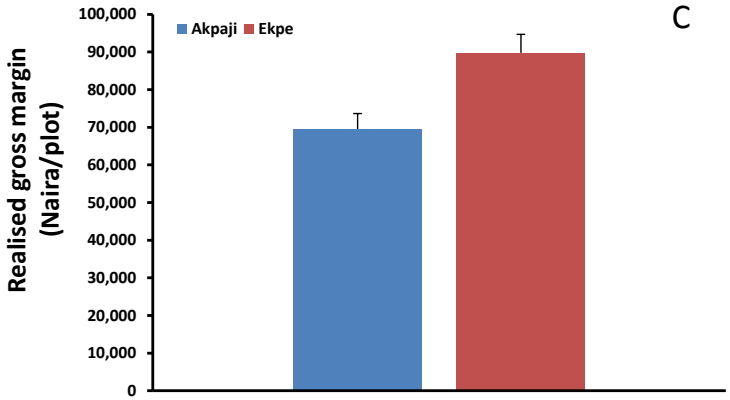
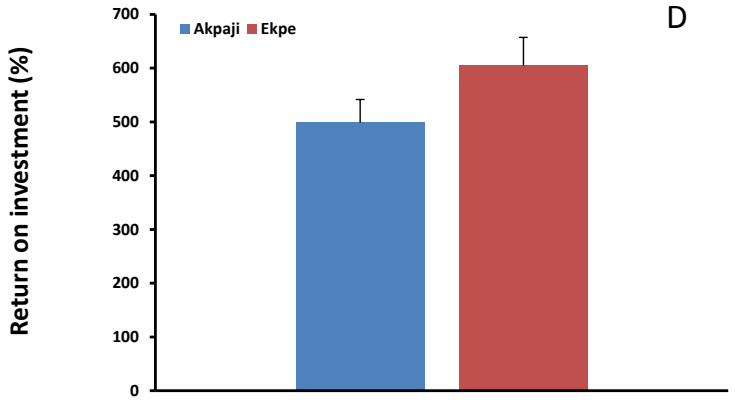


Figure 21. Mean total cost (A), revenue (b), gross margin (C) and return on investment (D). Figures are for the realised data and error bars are the standard error.







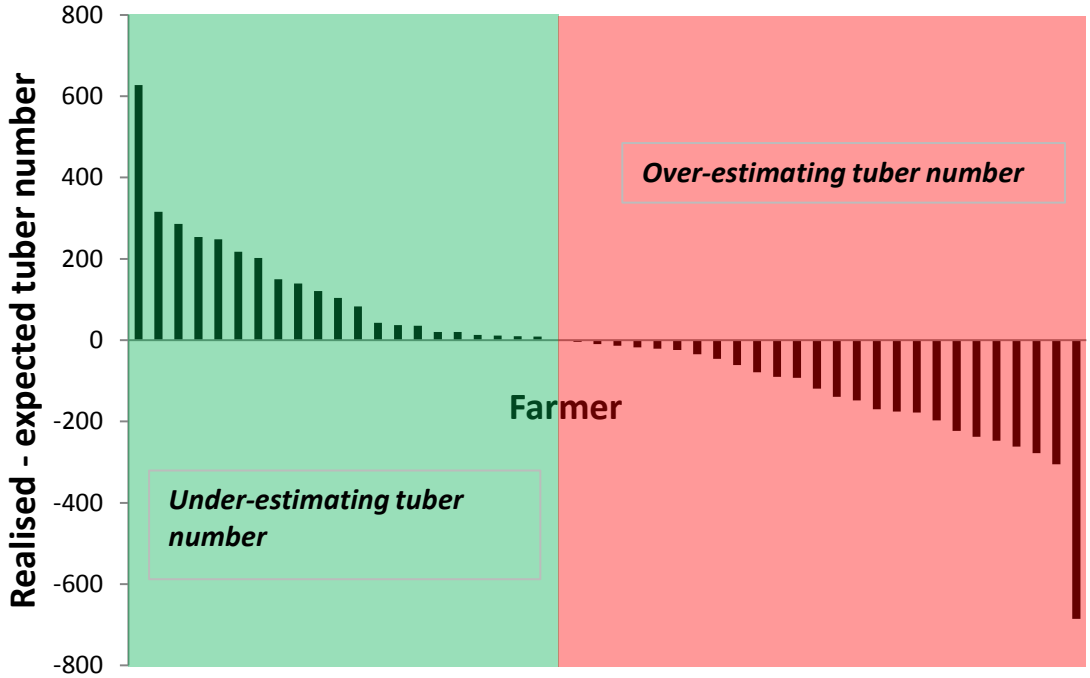


7.4 Expected versus realised costs, revenues and gross margins

The differences between expected and realised costs, revenues and gross margins were mentioned above but it is worth dwelling on them some more. The graphs in Figures 20 and 21 are based upon the means, and the data used to calculate them are presented in Figures 22 and 23. Each dot in these graphs is the anticipated and realised values for a single farmer in the data spanning 2012 to 2015. The horizontal axis is the anticipated values while the vertical axis is the realised values. The line running from the bottom left to the top right represents an exact match between the two and farmers falling onto that line have made a perfect prediction. While some farmers do get it 'right' for the most part farmers either under or over-estimate the values and thus the dots are spread around the line of perfection into the red and green zones.

As none of the entrepreneurs sold their harvest it is not possible to have an exact estimation of revenue in the same way that it can be achieved with cost; it is simply not possible to know the prices achieved by farmers. In terms of tuber number, the only component of the revenue equation that can be known with certainty, the expected figures from farmers tend to be constant at around 800 per plot – estimated on the basis of just over 2 tubers being harvested per square metre with a plot size of 400m^2. Thus rather than plot expected versus realised tuber numbers Figure 22 is instead the difference between the two, with each bar representing the difference for an individual farmer between 2012 and 2015. The data have been ranked with high positive values to the left (under-estimation of tuber number) and negative values (over-estimation of tuber number) to the right. As can be seen from Figure 22 the data suggest that while some farmers do under-estimate their tuber number the majority seem to over-estimate what they will get, and this would have a significant impact on their anticipated revenue.

Figure 22. Plots of realised – expected tuber numbers harvested per plot.



In terms of cost (Figure 23a), the distribution of dots tends to suggest that more farmers over-estimate the costs (green zone) rather than under-estimate them (red zone). For the most part the anticipated costs were higher than the realised costs, perhaps suggesting that farmers tended to error on the conservative side when setting out what costs they think they may incur This is caused by a number of factors but primarily an over-estimation of the costs of planting material and labour.

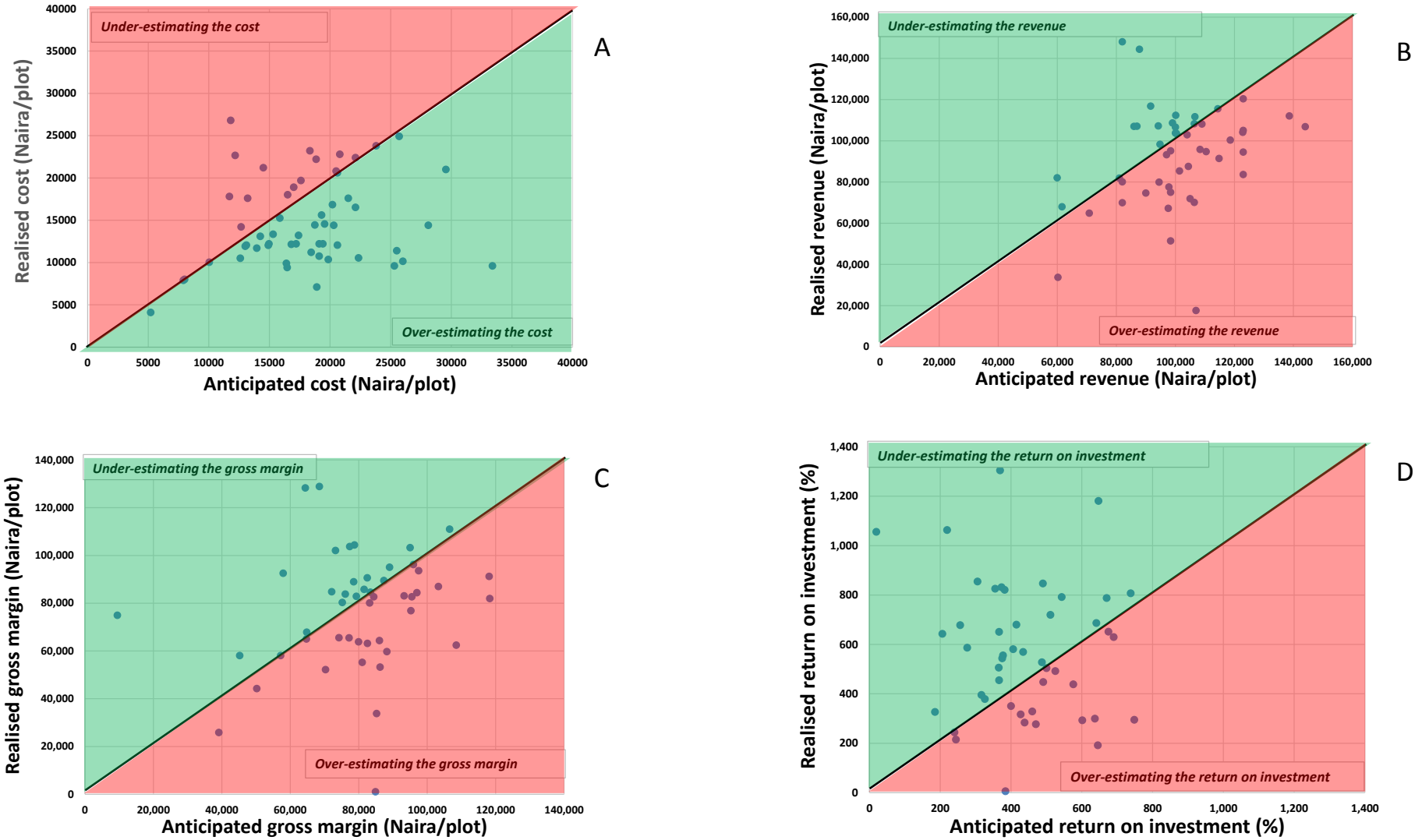
Interestingly, it would seem that the balance suggests that farmers also tend to over-estimate their revenue (Figure 23b), although here matters are complicated because an estimation of revenue depends upon an estimation of harvest (number of tubers and their size distribution) and average price. As noted above the latter is complex because price per tuber is itself a function of tuber size and quality, and will also depend upon the time of marketing.

For the gross margin, the data in Figure 23c suggest that if anything there is a tendency to over-estimate the gross margin, although the balance between over and under-estimation is perhaps more uniform than for the cost and revenue variables. Hence while there is a tendency to over-estimate cost there is also a tendency to over-estimate revenue.

For the return on investment (Figure 23d) the data suggest that farmers tend to under-estimate this variable, largely because they over-estimate the cost.

Is there any evidence that the entrepreneurs are arriving at better estimates of cost, revenue and gross margin over time? This may be a reasonable assumption but is difficult to address here as only a few entrepreneurs remained for all of the years between 2012 and 2015. Therfore, if anything, looking for a better match between expected and realised economic variables is more of an assessment of the ability of the facilitator than it is of the farmer. Indeed the use of regression analysis with year as the dependent varaible and difefernce between realised and expected cost/reveneue/gross margin does not produce any statistcially significant results. It also has to be said that there is no statistcially significant relationship between between any of the anticipated and realised variables; a farmer is as likely to under- or over-estimate irrespetive of the size of the variable.

Figure 23. Plots of realised – expected data for costs (A), revenue (B), gross margin (C) and returns on investment (D).



8 Conclusions

From the results presented here it is clear there are a number of key conclusions emerging.

The results from the entrepreneur plots suggest that the AYMT performs well in agronomic terms. They also suggest that treating the setts does help improve survival once planted and leads to a greater weight of yam compared to the use of untreated setts. However, it has to be said that this is not all that surprising given that similar conclusions have already been published by Morse and McNamara (2015, in press). The yield data presented here therefore does not necessarily provide new insights, rather they endorse them, although it can be seen that the agronomic performance does vary over seasons. The year 2013 produced markedly better yield results than did 2014 and 2015, and this may be attributed to a more favourable rainfall pattern that year which allowed for timely planting and crop growth.

Farmers can make a healthy profit from growing seed yam. This is, admittedly, a fragile conclusion in the sense that it depends upon imputed values for revenue as the farmers did not actually sell their produce, but the evidence based upon number of tubers harvested does seem to suggest that the vast majority of farmers would have obtained positive gross margins and some of these would have been very healthy.

The relatively high cost of the AYMT when compared to other cropping options is an important consideration for the farmer; this is a factor that limits yam production in general. Even when the cost is estimated purely in terms of what the farmer spends – without attempting to impute costs of household labour or to allow for depreciation of items such as hoes etc. – the costs as experienced by the farmer are relatively high. Producing crops such as maize and cassava is much cheaper than producing yam.

A limitation to sales of seed yam in the Idah area is the absence of a local value chain that connects farmers to a seed yam market. This strikes at the very heart of being able to generate a sustainable clean seed yam system as in the absence of such a value chain the farmers tend to keep all of their seed yams for planting the next season or consume them. There is little incentive for them to grow more seed yams than they need for planting.

The AYMT is a viable technique both in agronomic and economic terms that allows farmers to generate good quality seed yams. This has been shown from all of the demonstration plots established by MSHR but is reaffirmed by the entrepreneur plots. This is despite the relatively high cost of seed yam production noted above. The key issue is obviously the availability of start-up capital. The price of yam is consistently high and does not fluctuate to the extent that crops such as maize and cassava endure. But it should also be remembered that seed yam is a means to an end. The farmer is primarily interested in ware yam production and seed yams are a welcome input into that endeavour.

The business plan was certainly a challenge for farmers. They appeared to struggle with the notions of predicting cost and revenue, and much time had to be spent going through and explaining these variables. While it was well known that 'form filling' is always a struggle, especially when it comes to recording farm revenues, it was nonetheless a surprise to MSHR how challenging the business plans proved to be. Much of this seemed to be attributed to a desire not to provide information regarding income, although farmers were more than willing to provide costs. The issue with the latter was that farmers tended to over-elaborate what they considered to be costs. At the start of the project the anticipated costs were more of a 'wish list' than bearing any resemblance to reality, but towards the end of the project these had become more realistic. With regard to revenue this remained a considerable challenge especially as farmers claimed that they were not selling any of their seed yam.

As far as MSHR could ascertain, without too much intrusion into their personal affairs, this was indeed the case.

The results suggest that the establishment of a sustainable clean seed yam system in the Idah area is still some way off. Entrepreneurs can be facilitated and it is possible (in theory) for them to make a good profit and return on investment from producing seed yam using the AYMT. Similarly, while the business plan approach presents significant challenges, and no doubt farmers would prefer not to record anything, especially in terms of revenue, there is no doubt that it can be institutionalised and while there may be reluctance amongst farmers it should, if nothing else, provoke thought as to the viability of an enterprise.

While the basis for MSHR's activities in promoting these seed yam farmers may be regarded as community entrepreneurship there are still missing links in the system. MSHR has begun to sound out (2015 to 2016) local traders to see if they can be encouraged to help set up the value chains and the work is very much ongoing. This is an area that needs further refinement in the coming years. Also, of course, is a need to address the high up-front costs required for the AYMT. While the returns on this investment are good the farmer still needs to find the money to make the investment. Until now, MSHR has helped with this by providing planting material to the entrepreneurs and given that this is a significant proportion of the total cost then it is not surprising that volunteers for the programme have been abundant. But this support from MSHR cannot be sustained and the expectation is that farmers should be able to do this for themselves. At this point it has to be noted that the establishment of the AYMT entrepreneur plots does present a degree of risk for the farmer. Over the four years of the programme described here, two years in particular (2012 and 2015) had a significant loss of plots because of flooding. Given the relatively high level of cash investment required to establish these plots there is understandably a degree of concern from the farmer. There are no insurance systems in place and one question that may be asked is whether it is possible to establish a seed yam insurance programme (SYIP)? The farmers could pay a small premium to protect themselves against crop failure and in the event that the plot fails then they would receive a payment that compensated them for their loss. SYIP would be an interesting initiative to pursue although the administration and indeed policing required for such a system in order for it to be viable would be significant. There is, nonetheless, much to consider here.

The seed yam entrepreneurship programme in YIIFSWA has been an enlightening experience for all involved. MSHR has followed much the same model over the four years to date of the programme, and the intention here was largely to work, as much as possible, with the same farmers in a sustained manner. However, it has to be said that there were some changes in those involved over the years. This was partly driven by a change in resource availability but also because MSHR wanted to give others a chance; demand for the plots has certainly outstripped supply. But it has not all been solely about economic entrepreneurship, although it obviously is important to explore the economic viability of the approach. It was also expected that the entrepreneurs would act as a vehicle to engender a wider appreciation of seed yam production using AYMT amongst both farmers and yam traders. In a sense the programme was founded on a community entrepreneurship (Mtika, 2013) and an assumption that the entrepreneurs would create a wider appreciation of the benefits of producing and marketing seed yams.

While the seed yam entrepreneurship programme designed and implemented by MSHR in YIIFSWA has generated much insight, and the adoption of a community entrepreneurship type of approach is novel, there is still much to do. One concern remains the relatively high financial cost of establishing a seed yam plot, and much of this is due to the need to buy ware yams for sett production. Are there other more cost effective ways of providing planting material? There are certainly other ways of

producing yams, including aeroponics and the use of vine cuttings, but the viability of these under farmer conditions needs to be explored. There is certainly much more technical work that needs to be done here, and while aeroponics, for example, appears to have much potential the facilities and skills required are extensive and expensive. The point above about insurance provision to address risk is another interesting angle although there are certainly challenges involved, including the vital ingredient of trust. Finally, there is the need to continue a discourse with the traders. While the establishment of a viable value chain is, of course, important it does not in itself solve the issue of high cost of establishment of seed yam plots or indeed the risks involved. Traders largely come into the picture once the seed yams have been produced and not before. If the farmer knows that there is a value chain for conveniently selling his/her seed yam then this certainly helps, but the farmer still has to provide the finance and shoulder the risks inherent in this occupation. The challenges in establishing a viable seed yam production system are certainly multi-faceted and extensive, but great progress has been made and the goal is within reach.

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10 References

Adeola, A. (2015). A Study of the Challenges of Women Entrepreneurs in Akure City of Ondo State, Nigeria. *Journal for Studies in Management and Planning* 1(5), 370-380.

Aidoo R, Nimoh F, Bakang J-E A., Ohene-Yankyera K, Fialor S C, Mensah J O and Abaidoo R C (2012). Estimation of Margins and Efficiency in the Ghanaian Yam Marketing Chain. *Asian Journal Agriculture and Rural Development* 2(2), 226-234.

Asumugha, G. N. and Chinaka, C. C. (1992). Socio-economic and cultural variables influencing adoption of yam minisett technique in three eastern states of Nigeria. In M. C. Igbokwe, L. S. Eluagu, Asumugha G. N. and Mbanason J. A. Proceedings of the 32nd annual conference of the Agricultural Society of Nigeria.

Asumugha, GN, Njoku ME, Okoye BC, Aniedu OC, Ogbonna MC, Anyaegbunam HN, Akinpelu OA, Ibeagi O and Amaefula A (2009). An analysis of the supply for seed yams in Nigeria. *African Journal of Business Management* 3 (1), 28-31

Carnevale (1990). ASTD/DOL Study of Skill Development. Retrieved from www.google.com/document & selling/user/skill.

Chidiebere O-N., Iloanya K. and Udunze U. (2014). Youth unemployment and entrepreneurship development: Challenges and prospects in Nigeria. *Kuwait Chapter of Arabian Journal of Business and Management Review* 4(4), 20-35.

Chikwendu, D. O., Chinaka, C. C. and Omotayo, A. M. (1995). Adoption of minisett technique of seed yam production by farmers in the Eastern Forest Zone of Nigeria. *Discoveries and Innovations* 7 (4): 367-375.

Creech H, Paas L, Gabriel GH, Voora V, Hybsier C. and Marquard H. (2014) Small-scale social-environmental enterprises in the green economy: supporting grassroots innovation. *Development in Practice* 24(3), 366-378

Dawtry, B. (ed.) (1980). Elaeis. A journal of Igalaland. 2 (2).

Egai NA (2008). Entrepreneurship Development: for Increased Competitiveness and Business Growth. Institute of Chartered Economists of Nigeria's Seminar. Abuja.

Ezeh, N. O. A. (1991). Economics of seed yam production from minisetts in Umudike in Southeastern Nigeria: Implications for commercial growers. In F. Ofori and S. K. Hahn Tropical Root Crops in a Developing Economy. Proceedings of the 9th Symposium of the International Society for Tropical Root Crops, 20-26th October, Accra Ghana, pages 378-381.

Ezeh, N.O.A. (1998). Economics of production and Post-Harvest Technology. In: Food yams: Advances in Research Eds. Orkwuor, G.C., R. Asiedu and I.J. Ekanayake., International Institute of Tropical Agriculture, IITA, Ibadan, Nigeria pp 187-214.

Hahn, SK, Osiru DSO, Akorada MO, and Otoo JA (1987). Yam Production and its future prospects. *Outlook on Agriculture* 16, 105-110.

Ibana S., Coyne D., Claudius-Cole A., McNamara, N and Morse S. (2012). Economic analysis of commercial seed yam production systems in the sub-humid ecologies of the River Niger. *Journal of Crop Improvement* 26, 22–38

Ikeorgu, J.G and Dabels V.Y (2005). Studies on the Performance of seven released hybrid white yam (Dioscorea rotundata) varieties for minituber production. Annual Report, NRCRI, Umudike.

Korada RR, Naskara SK and Edison S. (2010). Insect pests and their management in yam production and storage: a world review. *International Journal of Pest Management* 56(4): 337-349

McNamara, N. and Morse, S. (1998). *Developing financial services. A case against sustainability*. On Stream Publications: Cork.

McNamara, N, Morse S, Ugbe UP, Coyne D and Claudius-Cole A. (2012). Facilitating healthy seed yam entrepreneurship in the Niger River system in Nigeria: the value of 'Research Into Use'. *Outlook on Agriculture* 41(4), 257-263

Mignouna D. B., Abdoulaye T., Alene A., Aighewi B., Pelemo O., Manyong V. M., Asiedu R. and Akoroda M. (2013). Economic analysis of seed yam production systems in Nigeria. *Journal of Root Crops* 39(2): 221-229

Mignouna D.B., Akinola A.A., Suleman I., Nweke F., and Abdoulaye T. (2014). Yam: A cash crop in West Africa. YIIFSWA Working Paper Series No. 3, International Institute of Tropical Agriculture. Ibadan, Nigeria.

Morse, S., McNamara, N and Acholo, M. (2009). Potential for clean seed yam minisett production by resource-poor farmers in the middle-belt of Nigeria. *Journal of Agricultural Science* 147(5), 589-600.

Morse S. (2011). Yam insects: Ecology and control. In Encyclopedia of Pest Management, David Pimentel (editor). Taylor & Francis, New York.

Morse, S., McNamara, N and Acholo, M. (2009). Potential for clean seed yam minisett production by resource-poor farmers in the middle-belt of Nigeria. *Journal of Agricultural Science* 147(5), 589-600.

Morse S. and McNamara N. (in press). Impact of the Adapted Yam Minisett Technique on ware yam (Dioscorea rotundata) production under farmer-managed conditions in Nigeria. *Experimental Agriculture*.

Mtika MN (2013). Economic Security in an Agrarian Community. *Africa Development* 38(1&2), 1–24

Muzac-Tucker I, Asemota H and Ahmad HM (1993). Biochemical composition and storage of Jamaican yams (Dioscorea spp). *Journal of the Science of Food and Agriculture* 62, 219-224.

Njoku AC, Ihugba OA and Odii A. (2014). Theoretical Analysis of Entrepreneurship Challenges and Prospects in Nigeria. *International Letters of Social and Humanistic Sciences (International Letters of Social and Humanistic Sciences)* Issue 5, 21-34

Nweke FI and Ezumah HC. (2012). Cassava in African farming and food systems: Implications for use in livestock feeds. FAO, Rome. Available at www.fao.org/Wairdocs/ILRI/x5458E/x5458e04.htm. Accessed on the 20th December, 2012.

Ogbonna, M.C., Anyaegbunam H.N and Asumugha, G.N (2011a). Price Response Analysis of Yam Tubers in South Eastern Nigeria: Evidence from Two Major Markets in Abia State. *Journal of Farm Management of Nigeria* 12(2), 34-40

Ogbonna, M.C., D.S. Korieocha, V.O. Onyenobi AND S.C. Njoku (2011b). Profitability of minituber seed yam production technique in south east agro-ecological zone: evidence from Abia state, Nigeria. *Journal of Agriculture and Social Research* 11(2), 113-119.

Oguntade AE, Thompson OA and Ige T (2010). Economics of Seed Yam Production Using Minisett Technique in Oyo State, Nigeria. Field Actions Science Reports Vol. 4 | 2010, Online since 21 January 2011, Connection on 21 September 2012. URL: http://factsreports.revues.org/659

Okeke EC, Eneobong HN, Uzuegbunam AO, Ozioko AO and Kuhnlein H (2008). Igbo Traditional Food System: Documentation, Uses and Research Needs. *Pakistan Journal of Nutrition* 7(2), 365-376.

Okoli, P. E. (1972). *A short history of Igala*. Matanmi and Sons: Illorin, Nigeria.

Okoro, J. K. (2008). Awareness and Use of the Rapid Seed Yam Multiplication Technology by Farmers in Nigeria's Yam Belt. *Production Agriculture and Technology Journal* 5(1), 22-29

Onwubiko CM (2011). Entrepreneurship and leadership; Nigeria and the Imperative for Youth Entrepreneurial Development. *Universal Journal of Education and General Studies* 1(3), 55-70

Onyenobi V. O, Okoye B. C., Ezeh C. I., Ewuziem J. E., Ogbonna M. C. and Mazza M. A. (2014). Analysis of yam marketable surplus in Imo state, Nigeria. *Nigeria Agricultural Journal* 45(2), 63-70.

Orkwor, G.C. and Adeniji, A.A. (1998). Production constraints and available technologies for food yam (Dioscorea spp.) production in Nigeria. In: L'igname, plante séculaire et culture d'avenir. Actes du séminaire international Cirad-Inra-Orstom-Coraf, 3-6 juin 1997, Montpellier, France, Berthaud, J. : Bricas, N. : Marchand, J.-L., CIRAD, Montpellier, France, p. 409-414.

Osunde C. (2014). Entrepreneurs and Entrepreneurship in Developing Countries: The Nigerian Experience. *The SIJ Transactions on Industrial, Financial & Business Management* 2(2), 26-32.

Oyetunji O.J. and Osonubi O. (2008). The roles of improved cropping systems and an arbuscular mycorrhizal fungus on yam productivity in degraded soil. *Crop Research* 35(3), 245-254.

Salewa AO and Ikechukwu EV (2012). Entrepreneurship development: Engine for national economic development. *Prime Journal of Business Administration and Management* 2(12), 803-808

Schumpeter J (1995). *Theory of Economic Development*. Cambridge: Howard University Press.

Tobora OO (2015). Challenges faced by entrepreneurs and the performance of small and medium scale (SMEs) In Nigeria: An Intellectual capital issue. *International Letters of Social and Humanistic Sciences* 42, 32-40

Towobola W.L, Luqman Raimi, Kolade T.T, Ogunwale A.B, Olakojo S.A (2014). Entrepreneurship: A Vehicle for Sustainable Food Production in Nigeria. *Journal of Poverty, Investment and Development* 5, 73-77.

UNIDO (1999). *How to set up a small business*. London, University of Cambridge

Verter N and Becvarova V (2014). Yam production as pillar of food security in Logo Local Government Area of Benue State, Nigeria. *European Scientific Journal* 10(31), 27-42.