GhanaVeg Final Report 2013-2017

Quality and healthy vegetables from Ghana through new ways of doing business

Joep van den Broek, Hanson Arthur, Patricia Asamoah, Sheila Assibey-Yeboa2 and Irene Koomen

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GhanaVeg is a programme that was supported by the Netherlands Embassy in Ghana and ran from 2013 till 2017. The objective of GhanaVeg was to establish a sustainable and internationally competitive vegetable sector that contributes to inclusive economic growth and has the capacity to continuously innovate in terms of products and services. During the lifespan of the project more than 20 business initiatives, and more than 10 public-private partnerships were supported. The report describes the major outcomes and outputs of the programme in terms of export growth, domestic market development, increase in farmer productivity and contributions to a more conducive business climate.

GhanaVeg is een programma dat uitgevoerd is in opdracht van de Nederlandse Ambassade in Accra en liep van 2013 t/m 2017. Het doel van GhanaVeg was om te komen tot een duurzame en internationaal concurrerende groentesector, die bijdraagt aan inclusieve economische groei met het vermogen om continue te kunnen innoveren op het gebied van producten en diensten. Gedurende de projectperiode zijn meer dan 20 private sector initiatieven en 10 publiek-private partnerschappen ondersteund. Het rapport beschrijft de belangrijkste resultaten van het programme met betrekking tot exportgroei, de ontwikkeling van de binnenlandse groentemarkt, verhoging van de landbouwproductiviteit en de bijdrages aan een gunstig investeringsklimaat.

Keywords: Vegetables, private sector development, public-private partnerships, Ghana

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Photo cover: Sheila Assibey-Yeboah

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Preface

GhanaVeg has been a programme dedicated to improving the vegetable sector in Ghana. The programme started in 2013 and gradually built its reputation throughout Ghana, with farmers, companies, researchers and government officials. The unique feature of GhanaVeg has been its convening power; bringing together public and private actors that hitherto didn't know or trust each other.

The implementation period of GhanaVeg from the offset encountered many, external, challenges. Immediately in 2014 it became eminent that an EU export ban – for a selected number of vegetables was imminent and became a reality in 2015. Having a pro-active, pragmatic and facilitating approach, the programme was able to address this major setback, and through the support for alternative export vegetables and the Export Taskforce the ban finally was lifted in 2017. More importantly, sound systems were put in place both at government and company-level to ensure an import ban strikes again.

The Embassy of the Kingdom of the Netherlands in Accra has been the funder but also a strong partner in the implementation of the GhanaVeg programme. Combining development cooperation with economic diplomacy proved crucial to advocate solutions for individual companies and more generally at policy level. As such, the GhanaVeg programme is a true exponent of the Aid and Trade policy of the Netherlands government, combining support for economic growth and trade, with inclusiveness and sustainability.

Ir H.I.J. Bruggeman
Director
Wageningen Centre for Development Innovation, Wageningen University & Research

Acknowledgements

The GhanaVeg team would like to sincerely thank all the companies, farmers, researchers and government representatives that participated in our projects, events and trainings. From the start we have tried to position GhanaVeg as a movement, and not just as 'another project'. Through the frequent calls, emails, Facebook posts and face-to-face discussions we have felt that we have come a long way in the emergence of a vegetable community in Ghana.

We would also like to thank the Netherlands Embassy in Accra, not only for its financial support but also for being part of that GhanaVeg community, actively participating in the GhanaVeg events, providing guidance on the public sector component and brokering solutions for specific bottlenecks. Through the Embassy's business network we were able to connect to new Dutch businesses, exploring investments in Ghana.

Lastly, we would like to thank all the people from the Netherlands that in one way or another joint our activities. Over the years we have been in touch with more than 50 businessmen, entrepreneurs and researchers that all provided us with new insights on how to shape the implementation of the programme. Especially the farm visits with a number of Dutch seed companies come to mind; where on the spot simple solutions were provided for production problems that had been present for decades.

List of abbreviations and acronyms

BO	Business Opportunity
CRI	Crops Research Institute
DG	Director General
EPA	Environmental Protection Agency
ETL	Eden Tree Ltd
FDA	Food and Drug Authority
FVO	Food & Veterinary Office of the EU (now Health & Food Audits and Analysis)
GAP	Good Agricultural Practice
GAVEX	Ghana Association of Vegetable Exporters
GEPA	Ghana Export Promotion Authority
GSA	Ghana Standards Authority
IFPRI	International Food Policy Research Institute
IPPC	Internal Plant Protection Convention
MoFA	Ministry of Food and Agriculture (Ghana)
NABC	Netherlands African Business Council
PPRSD	Plant Protection and Regulatory Services Directorate (part of MoFA)
R&D	Research & Development
RVO	Rijksdienst voor Ondernemend Nederland (Netherlands Enterprise Agency)
SME	Small and Medium Enterprise
SPS	Sanitary & Phytosanitary agreement
SRID	Statistics, Research and Information Directorate (part of MoFA)
ToT	Training of Trainers
UoG	University of Ghana
WACCI	West Africa Centre for Crop Improvement
WEcR	Wageningen Economic Research
WCDI	Wageningen Centre for Development Innovation, Wageningen University & Research
WTO	World Trade Organisation
WUR	Wageningen University & Research

Executive Summary

The GhanaVeg programme, December 2013 till April 2018, focused on the development of 'a sustainable and internationally competitive vegetable sector that contributes to inclusive economic growth and has the capacity to continuously innovate in terms of products and services'. The motto was: Healthy and quality vegetables through new ways of doing business. GhanaVeg focused on the high-end domestic and export markets, having a strong private sector development focus.

In the 2013-2017 period the programme supported around 30 innovative projects that were implemented by lead companies and research institutions. In addition, the programme worked on a number of issues in the enabling environment, ranging from phytosanitary issues to food safety, and from environmental concerns to public awareness on health and nutrition. GhanaVeg organized 20 well attended Business Platform meetings; four Round Table meetings, five trade missions and three trade fairs, which strengthened sector partnerships and business to business trade deals.

Overall, GhanaVeg worked with close to 7.000 smallholder farmers directly. These farmers were either part of outgrower schemes organized by lead companies or were involved in series of intensive trainings on good agricultural practices. GhanaVeg achieved a productivity increase of more than 50% for 4.305 smallholder farmers. Positive examples here are the collaboration with Tikola/East West Seeds and the GhanaVeg agronomy trainings. This was done through a focus on quality inputs (seeds, fertilizers and crop protection products), field trainings and demonstrations. Through training of trainers modules close to 60 agronomists received an intensive year-long training and in turn each trained more than 50 farmers. The increased farmers' income was often used to improve their family's quality of life, spending it on school fees, books, clothing and health care (39%), household items (including food and utilities) scored high too (with 22%), whereas 26% re-invested the money in the farm to acquire land, labour or inputs and machinery. Another 8% used the money for savings.

The biggest successes of GhanaVeg have been achieved in the domestic market. The number of quality wholesalers and retailers has increased sharply and their number of outlets and sales volumes have increased exponentially. A case in point is GhanaVeg partner Eden Tree Ltd. that grew more than 10-fold in turnover over a period of five years. Also, the overall quality vegetable retail market in Accra grew substantially from an estimated US$ 1 million in 2013 to over US$ 10 million in 2017. Recent research, commissioned by GhanaVeg and implemented by IFPRI, shows that wholesale prices for chillies, carrots and onions are still much higher in Ghana than in neighbouring countries like Burkina Faso and Ivory Coast. The main reason for this is believed to be the lower productivity in Ghana and 'trader-organized' restrictions, the latter referring to the system of market queens that control the entry to the main open markets of Accra and Kumasi. Supporting alternative market outlets can provide new options for farmers, while at the same time these new market players more heavily invest in certification, under the Ghana Green Label scheme, and support to farmers through their outgrower schemes.

The results on vegetable exports have been disappointing. While Ghana exported US$ 1,8 million in the baseline year of 2013, exports dropped as low as US$ 600.000 in 2016. The target of US$ 10 million was not reached for various reasons, the most important reason for the drop in exports was the import ban of for chillies, eggplants and gourds imposed by the European Union. These vegetables comprised roughly 80% of all vegetable exports; leaving only vegetables like okra, butternut, tinda and a number of leafy vegetables exempted. The ban lasted from October 2015 till December 2017, the most important part of the GhanaVeg implementation period. The programme decided to take on this challenge and contributed strongly to the establishment of the Export Taskforce which tasked with putting in measures in place to lift the ban. The programme also paid much attention on alternative export crops such as okra, tinda, curry leaves and butternut. As such GhanaVeg contributed to the slight increase in (alternative) vegetable exports from US$ 617.936 in 2016 to US$ 832.915 in 2017. Specific examples in this area are the projects with Joekopan and AB Farms that significantly

expanded their okra and tinda production, working with more than 100 outgrowers at a number of locations in the Volta and Eastern Regions.

Through its agronomy trainings and support for certification more than 1.000 farmers now have a certificate for good agricultural practices, either GlobalGAP or Ghana Green Label. Crops produced by these farmers comply to high standards of food safety and farmers apply agrochemicals in a judicious way. Through the multitude of business partnerships that were established, facilitated through GhanaVeg events over 200 business-to-business initiatives started, often including dedicated matchmaking or 'speed-dating' activities.

At the end of 2017 the GhanaVeg network consisted of more than 1.100 business owners, researchers and government staff, all involved in vegetable sector activities. As such, the sum of the GhanaVeg results are greater than its parts. Examples of this are small and medium sized entreprises that started new activities based on GhanaVeg presentations and publications; some ventured into intensive vegetable farming by themselves or developed new consumer products for the high-end domestic market – without any direct support from GhanaVeg. Illustrations are provided in the main body of the report. In the encounters with companies they express their appreciation for this approach, feeling part of a sort of movement, being involved in GhanaVeg activities like the business platforms, trade fairs and newsletter communication.

GhanaVeg aimed to operate as a sector programme, working in an integrative manner on issues in the enabling environment, input supply, processing and marketing, as well as the world of finance. The main approach (and assumption) being that only through concerted effort by a multitude of stakeholders (including government and research) can Ghana move from a rather fragmented business landscape with low yields and low quality, to a sector in which business partnerships and dedicated chains thrive – decreasing chain inefficiencies and increasing income for the actors involved, especially farmers. The outcomes in terms of growth of the export and domestic market are promising and provide prove that this approach works; though much still needs to be done to truly become a sustainable and internationally competitive vegetable sector.

A number of lessons learned have been summarized as recommendations for the next phase of GhanaVeg, called HortiFresh (2018-2021). The most important ones are:

- Continue to put pressure on the public system to deliver on key public responsibilities in the domain of phytosanitary services, food safety and environmental sustainability through public-private partnerships – either in horticultural hotspots or at national policy level.
- Work together with a number of larger companies that have a proven track record with an annual turnover of more than US$ 150.000, and are at the tipping point of becoming reliable, quality conscious wholesalers, exporters and input suppliers, willing to invest in smallholder farming. Projects will be bigger and for a longer period of time, with more intensive backstopping and coaching.
- Intensify efforts to develop comprehensive training modules for groups of farmers, to move from a low input – low output to a high input – high output system in a sustainable way. Strong linkages with input suppliers and off-takers are key in this matter.
- Start dedicated projects with those Dutch companies that are willing to go the extra mile in combining trading (buying or selling products) with agronomic services and after sales support. Again the track record from the first phase of GhanaVeg will serve as a selection criterion for future engagements.

1 Introduction

The GhanaVeg programme, implemented between December 2013 till April 2018, focused on the development of "a sustainable and internationally competitive vegetable sector that contributes to inclusive economic growth and has the capacity to continuously innovate in terms of products and services". Based on this objective two pathways were determined, one focusing on competitiveness and one on innovation, supported by three conditions that needed to address the sustainability, inclusiveness and policy environment. For each of the pathways and conditions specific activities were developed, largely organized around a structure of funds: a business innovation fund, an innovation fund and a consultancy fund. Importantly, for all of the activities indicators, or targets, were developed that assisted us in monitoring progress. Together the set of indicators is a good measure for the increased competitiveness and sustainability of the sector.

This final report describes the results achieved in the GhanaVeg programme along the lines of the 2 pathways and three conditions. These are the five main chapters of the report:

- A competitive high-value vegetable sector (Chapter 4)
- A vegetable sector driven by innovation (Chapter 5)
- Sustainable production (Chapter 6)
- A conducive and enabling policy environment (Chapter 7)
- Inclusive economic growth (Chapter 8)

In addition, the overall Theory of Change is presented (Chapter 2) and the major outcomes of the programme (Chapter 3), as well as the work done on the outreach activities of GhanaVeg (Chapter 9 Communications) and an attempt to answer the question to what extent the activities have been sustainable and have been complementing other initiatives (Chapter 10 Sustainability and complementarity).

Throughout the report the results are highlighted from the major private sector project partners. More information is provided of the following projects[1]:

- AB Farms (outgrower scheme for exports - B.O.)
- Agri Commercial Services (breeding of new tomato and eggplant varieties – R&D)
- Agri Impact Consult (incubator system and training programme – B.O.)
- Dizengoff (cost-benefit analysis of tunnels – R&D)
- Eden Tree Limited (outgrower scheme and certification for domestic market – B.O.2x)
- GreenOK (introduction of new organic fertilizers – R&D)
- iDE (introducing new irrigation systems for small-scale farmers – B.O.)
- Joekopan (outgrower scheme and certification for exports – B.O.)
- Kukobila (production of butternut squash for domestic and export markets – B.O.)
- Linkougud (new solar irrigation system and outgrower scheme – B.O.)
- Lubok (innovations for greenhouse production – B.O.)
- Quarco Initiatives (organic herb production for exports – B.O.)
- RealIPM (introduction of biological control agents – R&D)
- Srighan (trials and trainings on IPM for export vegetable production – R&D)
- Sunripe (increasing water melon productivity and processing – B.O.)
- Syngenta (testing of new tomato varieties in different agro-ecological zones – R&D)
- Tacks Farms (production of herbs for domestic market – B.O.)
- Tikola/East West Seeds (demonstrations and trainings on use of hybrid varieties – B.O.2x)
- Touton (diversification for cocoa farmers in the Western region – B.O.)
- VegPro (greenhouse seedling production and farmer training – B.O.)
- VoltaVeg (outgrower scheme and certification for export – B.O.)
- Wienco (production and demonstration of locally developed pepper varieties – R&D)

[1] B.O. means those projects funded under the Business Opportunities Report and R&D those that were funded under the R&D Innovation Fund

2 Theory of Change

2.1 Theory of Change

Over the four-and-half years of its implementation, GhanaVeg used a Theory of Change approach in assessing and monitoring progress. The essential idea behind this approach is to recognize that in programme planning, assumptions are often made about how change happens or rather about how program implementers think change will happen. Therefore, by applying the Theory of Change model, GhanaVeg has been more explicit about the envisioned change processes and the underlying assumptions it made. In this way, the programme was aware of what information was critical to providing guidance during implementation.

In this regard, GhanaVeg, from the onset, formed a future-oriented perspective, looking at:

a. Which actors and factors were expected to play what roles and in what ways would they interact.
b. What the critical uncertainties were, as well as the change process and the associated risks involved.
c. How would the context emerge and or change (trends and developments) to affect the program (negatively or positively).
d. Expectations about the available capacities and conditions to make change happen. This included stakeholder motivation and stakeholder relationships.

Figure 1 below represents the Theory of Change of GhanaVeg. The figure was designed based on the overall mission of the programme, which was: "A sustainable and internationally competitive vegetable sector that contributes to inclusive economic growth and has the capacity to continuously innovate in terms of products and services". The Theory of Change distinguished two of the most important elements of the programmes mission:

- The focus on (international) competitiveness of the sector with a strong emphasis on economic parameters like: efficiency, productivity and investments.
- The focus on innovation and collaboration as key enablers for moving from isolated, individual successes to successes of the entire sector (spill-over / multiplier effects). This informed the focus on supporting new ways of doing business as is highlighted in the objectives of the GhanaVeg program: supporting technical innovations by the private sector to reduce cost price, and improve quality, productivity and sustainability.

Also in Figure 1, the three boundary conditions are presented:

- The necessity for sustainable production from both a food safety and environmental point of view. Here, GhanaVeg built on global and local codes of good agricultural practices, either existing or tailor-made for Ghana's vegetable sector. Based on this GhanaVeg's collaboration with the Ghana Green Label Scheme was initiated, along with two key partners: the Ministry of Food and Agriculture (MoFA) and GIZ.
- The importance of a conducive and enabling policy environment, including the business climate, the macro-economic framework (of loans and trade incentives), research and education system as well as the performance of the regulatory bodies. For example, the Export Taskforce was established under this umbrella of activities.
- The need for involving youth, women and small-scale farmers in the programme's implementation, in order to ensure inclusive or balanced economic growth. This has been implemented in a more 'cross-cutting' way, e.g. through incorporating specific conditions in the Calls for Proposals and training activities.

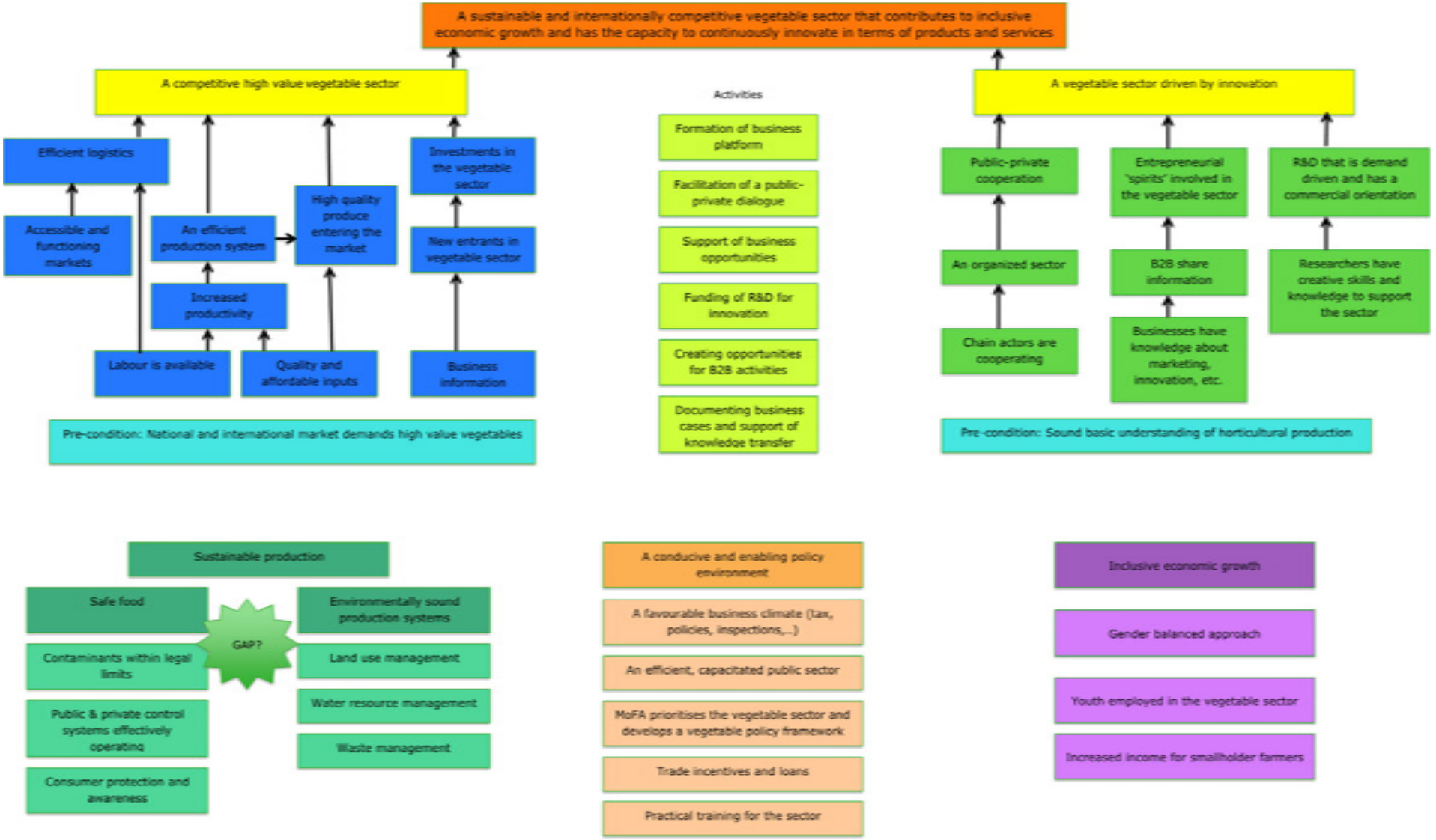


Figure 1 *Theory of Change of the GhanaVeg Program*

2.2 Pre-conditions and assumptions

Specific pre-conditions and assumptions, which could influence the overall success of the program, were set. Periodically, the GhanaVeg team checked these pre-conditions and assumptions in order to find out whether or not specific additional actions were required to address deviations where they occurred. In addition, some specific studies (through the consultancy fund) were commissioned to provide evidence for a dialogue in the Business Platform meetings, and Public-Private engagements. These pre-conditions and assumptions included the following:

Table 1 *Assumptions underlying the Theory of Change*

Crosscutting	Competitiveness	Innovation	Sustainability	Policy environment	Inclusiveness
A stable political and economic climate	High demand for quality vegetables in Ghana (consumer trends and preferences)	A culture of sharing of information and willingness to collaborate	Public and private sector are willing to invest in safe and environmentally sustainable systems	Business friendly government policies attract more investors to the vegetable sector	Youth are interested to work in the vegetable sector
The level of corruption remains under control	Genuine interest of the private sector to invest in high-value vegetables	Researchers have an open attitude to service-oriented R&D for the private sector		An effective public sector that can enforce regulations	Including disadvantaged groups in the Calls for Proposals results in inclusive growth
Information & data is made available by project implementers and government	Investments by (new) businesses results in increased market opportunities (spill-over effect)	A demand driven research agenda results in a competitive and innovative sector		A policy framework that provides a roadmap for investments in the sector	
	Labour costs remain competitive				

2.3 Addressing Pre-conditions and Assumptions

At the start of the programme there were at least two assumptions that needed specific attention. The first one focused on having a high demand for quality vegetables (consumer trends and preferences). In the first year we found that in general market information on the quality and safety of vegetables was seriously lacking. To this end an additional communication officer was recruited that produced monthly newsletters to the growing network of GhanaVeg 'members'. A Vegetable Cook Show, aired for 13-weeks was commissioned. This infotainment programme combined serious information on the production and processing of vegetables with cooking recipes including local and international dishes. In addition, specific round tables were organized to discuss these topics with vegetable wholesalers and retailers (see Chapter 9 Communications for more information).

The second assumption that needed further understanding was the one on sustainable production both from a technical and policy point of view. This concerned both the food safety and phytosanitary issues surrounding vegetable production. To this end a study was undertaken "Analysis of the Sanitary and Phytosanitary Status of the Vegetable Sector"; which guided the work of GhanaVeg with respect to the Export Taskforce, the work on the Ghana Green Label and the work done with the Food and Drug Authority (FDA). The results of these activities are presented in Chapters 6 and 7 on Sustainability and the Enabling Environment. An overview of all the reports produced by GhanaVeg is presented in Appendix 1 GhanaVeg Publications.

The overall state of Ghana's economy during the implementation period of the programme has been another cause of concern. After the discovery of oil, economic growth figures spiked to as high as 25% in the first quarter of 2012. Decreasing oil prices and macro-economic mismanagement caused a decline in growth starting in 2013 and most of the 2014-2017 period showed a modest growth rates of 5% on average (Ghana Statistical Service, 2018). It is only since the new government came to power that growth rates are on the up again, approaching 10% in 2018. It is hard to estimate what the effects have been of the macro-economic situation on vegetable sector investments; however, we did encounter a number of cases where companies delayed or cancelled investments because of too high interest rates and slowing demand for high-quality, and more expensive products.

Overall, the approach of using a Theory of Change helped us in being flexible towards achieving the overall mission while maintaining our eye on the ball: increasing the value of exports and high-value domestic market, while increasing productivity by farmers.

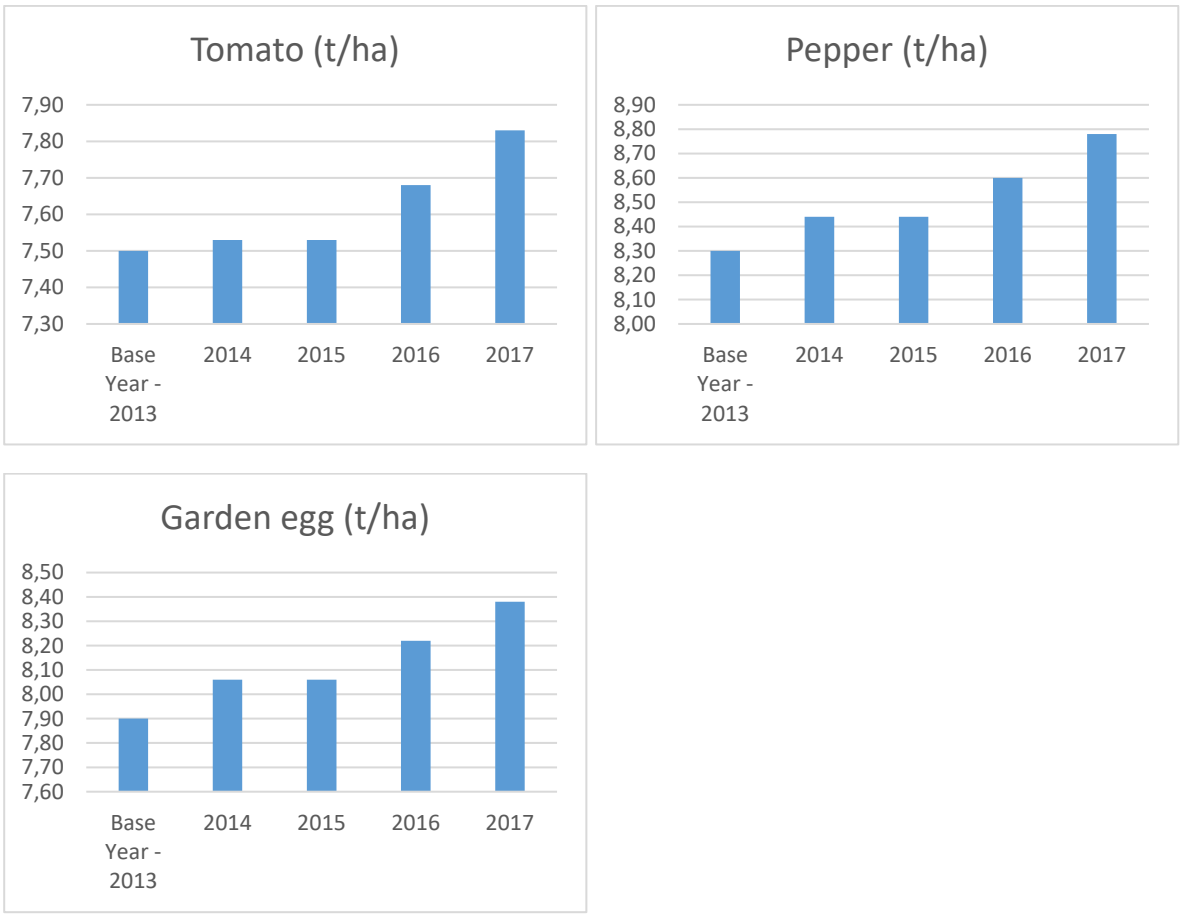
3 Outcomes of GhanaVeg

3.1 Introduction

The main outcome indicators of GhanaVeg were modelled around the (at that time prevailing) results framework ('resultaatfiche') of DGIS. In that framework the following outcome indicators were prioritized: productivity increase by smallholder farmers, export growth and growth in the domestic market. This chapter describes the achievements for those indicators.

3.2 Productivity increase

Country data were used for three crops as a measure for national productivity growth in Ghana's vegetable sector: tomato, pepper and eggplants (or garden eggs), as these are the most important vegetables in the common Ghanaian's diet. Data were obtained from the Statistical Service of the Ministry of Food and Agriculture, SRID. The following figures present the results:



Figures 2-4 *Productivity increase of three vegetables: tomato, peppers and garden eggs (MoFA-SRID)*

The results show that for tomato the productivity increased by 4% during the project period, from 7,50 t/ha to 7,83%; while for pepper and garden egg the increase was 6% (from 8,3 t/ha to 8,78 t/ha and from 7,90 to 8,38 t/ha respectively). The target for GhanaVeg was a +25% yield increase at the end of the programme.

However, it has been difficult to assess how accurate the MoFA-SRID figures are. It is known that SRID has not undertaken any actual measurements for these data and mainly depends on reports from the district offices to provide them with estimates, and also in the districts they don't actually measure productivity. As such these data are highly unreliable; and hence we information from project partners were used for an indication of productivity increase (see below).

In order to improve the national data we engaged with SRID in 2015. Through the Embassy and RVO we were able to engage the specialized Dutch Agriculture Statistical Service (Landbouw-Economisch Bericht, Wageningen Economic Research (WEcR)). A review of the agricultural information needs was initiated; looking at the demand (and usefulness) for collecting agricultural data. The report gave a number of recommendations, to develop a system that is simple (focusing on key indicators), support training for competent data collectors and provide clear incentives for all actors involved. In addition, there were two recommendations to start with: (1) support an agricultural census (to get one baseline right, as a reference point); and (2) experiment with study groups (especially for collecting economic data). Unfortunately, SRID proved a difficult partner to work with. The leadership showed little commitment to the project, and wasn't much interested in systematically addressing their challenges instead they were looking for project-based support. Together, the Embassy, WEcR and GhanaVeg, decided to discontinue the collaboration.

With respect to the programme activities a productivity increase was achieved of more than 50% for 4.305 smallholder farmers. This is below the target of 5.000 farmers. Positive examples here are Tikola and the GhanaVeg agronomy trainings. Through the work of Tikola more than 1.000 farmers increased their productivity. This was done through an intensive package of inputs (i.e. East West Seeds), field trainings and demonstrations. Additionaly, through GhanaVeg agronomy trainings about 60 agronomists received an intensive year-long training and in turn each trained more than 50 farmers (see also 6.6). Out of those 3.867 farmers roughly 25% were able to increase their yields by more than 50%.

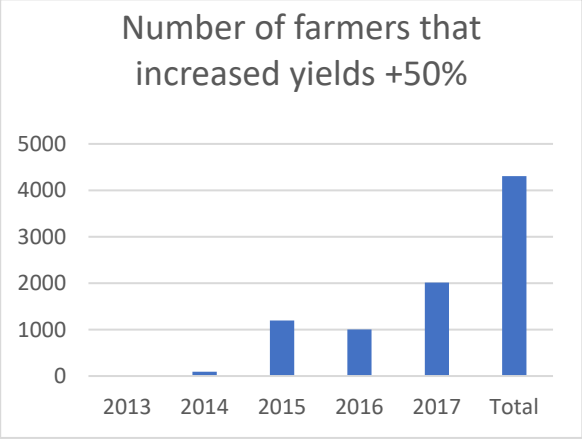


Figure 5 *Number of farmers supported directly that increased yields by more than 50%*

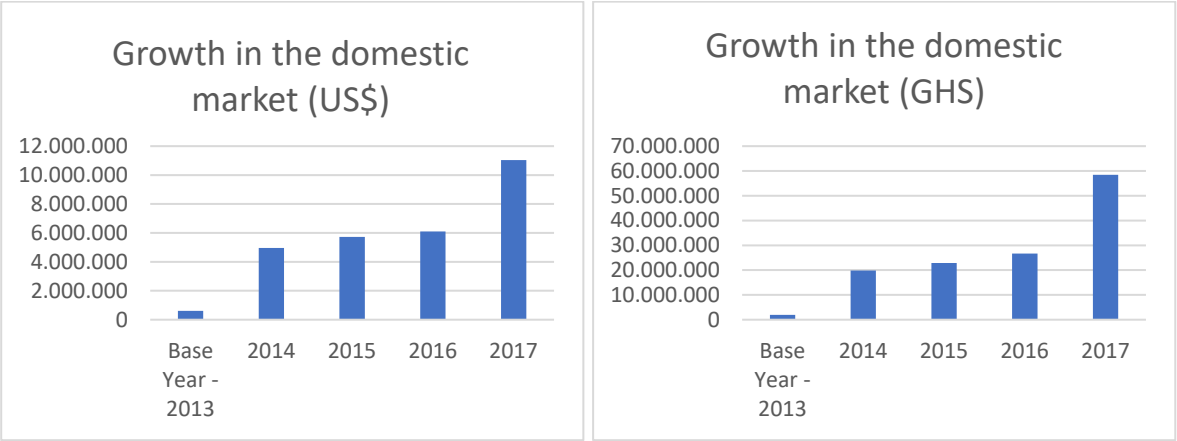
The lower than expected reach can be explained because many projects had difficulties attaining the number of outgrowers as envisaged beforehand. For many outgrower projects a target of 40-70 farmers was seen as more realistic than the 100+ farmers originally planned. This ties in with the fact that the export ban commenced in October 2015. This drastically reduced the income for export companies and hence their capacity to co-invest in the outgrower schemes. As a result a number of projects were not fully completed, lacking the last step of upscaling. This also relates to the

overall challenge of delayed implementation of the projects. Even though a no-cost extension till April 2018 was given to be able to complete the projects carried out by grantees, many partners were not able to finalize their activities in time. This had to do with limited implementation capacity and project management skills of (especially smaller) SME-partners. Lessons have been learned for the future of HortiFresh that projects need to be larger and are only implemented by larger SMEs with a good track record.

At the same time, it must be realized that the more than 4.000 farmers that did increase their productivity by 50% now have a sustainable basis for continuing this in the coming years. These farmers are well linked to input suppliers and markets, and have gained the agronomic skills to make the most out of their inputs and assets. In short, farmers that have become part of an outgrower scheme will most likely continue in this arrangement; unlike other 'NGO projects', where farmers are trained but fall back in their old practices after the life of the project.

3.3 Domestic market growth

The biggest successes of GhanaVeg have been achieved in the domestic market. The number of quality wholesalers and retailers has increased sharply and their number of outlets and sales volumes have increased exponentially. A case in point is GhanaVeg partner Eden Tree Ltd. (ETL) that grew more than 15 fold from a net turnover of US$ 60.000 over a period of 5 years. ETL data were used as a proxy for the overall high end market (ETL controlling a 10% market share), and cross-checked it with similar enterprises like Farmers Market, Freshmark and Fruitmaster. Also for them their sales have grown substantially. As such we dare to say that the overall vegetable retail market grew from US$ 607.000 in 2013 to over US$ 10 million in 2017. Figures 6 and 7 present the developments over the 2013-2017 period.



Figures 6-7 *Percentage growth (value GHS and US$) of vegetables in the high-value Ghanaian retail market*

In the period that GhanaVeg was operational several changes in the sector took pace. Some can directly be attributed to GhanaVeg's activities, for some GhanaVeg will have contributed but also other external changes/factors did. In the same line, apart from the grant projects and agronomy trainings, also the many Business Platform meetings, trade fairs, business cases and matchmaking sessions helped companies in their sourcing and marketing activities. A case in point is Farmers Market which met many (slightly larger) farmers at the Business Platform meetings, who then in turn became one of his suppliers. Also companies like ACSL and Agri Impact now supply Eden Tree, whereas Tacks Farms (for his herbs) linked up with a number of high-end hotels.

3.4 Exports

The results on vegetable exports have been disappointing. While Ghana exported US$ 1,8 million in the baseline year of 2013, exports dropped as low as US$ 600.000 in 2016. See Figure 8 below for the annual figures. The target of US$ 10 million was not reached for various reasons, the most important reason for the drop in exports was the import ban of the European Union, for chillies, eggplants and gourds. These vegetables comprised roughly 80% of all vegetable exports; leaving only vegetables like okra, butternut, tinda and a number of leafy vegetables exempted. The ban lasted from October 2015 till December 2017, the most important part of the GhanaVeg implementation period.

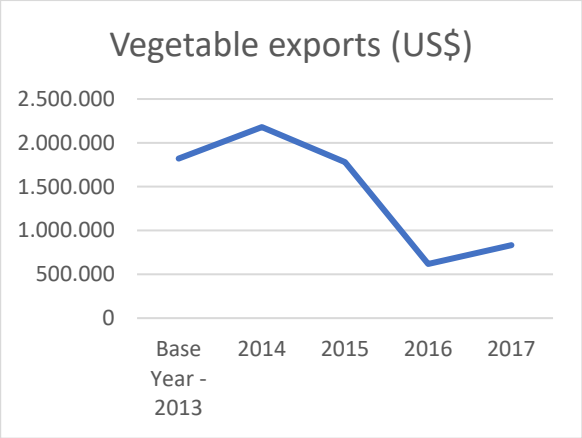


Figure 8 *Vegetable exports from Ghana in US$, 2013-2017 (GEPA)*

It was decided to take on this challenge and as such GhanaVeg was one of the main contributors to the Export Taskforce (tasked with putting in measures in place to lift the ban), and refocused on supporting a number of alternative export crops (okra, curry leaves and butternut). More on this is presented in the chapter on competitiveness (Chapter 4) and the enabling environment (Chapter 7). For here, we can only mention that GhanaVeg contributed to the slight increase from US$ 617.936 to US$ 832.915 in 2017; while for both years the ban was in place. Specific examples for this are Joekopan and AB Farms (see below) that significantly expanded their okra and tinda production under two GhanaVeg projects, working with more than 100 outgrowers at a number of locations in the Volta and Eastern Region.

3.5 End-line impact evaluation

At the end of 2017 131 farmers were interviewed that were directly involved in 14 GhanaVeg activities. Out of these 131 farmers 89% indicated that they have substantially increased their productivity and income. Most farmers (>90%) were able to achieve a revenue of more than GHS 6.000 per season and this was often unrelated to the field size of the farmer, showing that farmers with limited land size were able to intensify crop production and quality. Revenues per acre were highest for the following crops: onion, cabbage, lettuce, cucumber, tinda and aubergine (for export). Lowest revenues per acre were attained for tomato, chili pepper, garden eggs (African eggplant), beans and water melon. The following figure shows the results from the sample of 131 farmers.

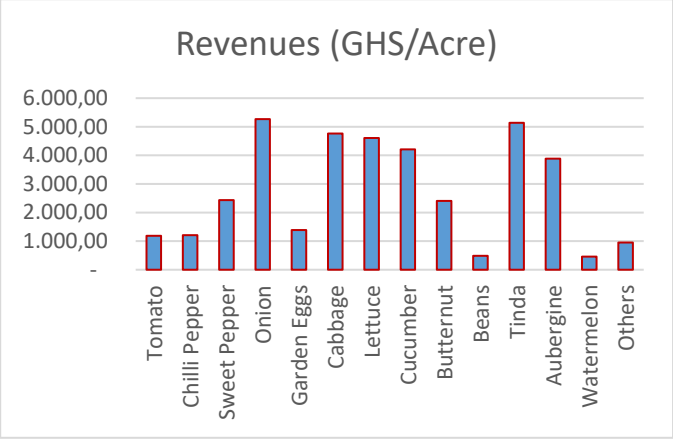


Figure 9 *Revenues of farmers directly supported by GhanaVeg per crop (in GHS/acre; GhanaVeg survey)*

The results were influenced by the outbreak of false coddling moth in pepper, tomato and garden eggs. The figure also shows that the export schemes achieved a lot in supporting farmers income (for aubergine, tinda). The high revenues for onions, cabbage and cucumber show that during the dry season prices are high; and farmers that mastered to grow these crops properly were fetching a high revenue.

Other results from the survey show that farmers 25% of the farmers re-invested their profits in the farm; either to purchase land, pay for casual labour or to buy inputs and machinery. While 29% of the farmers spent the money on school fees, health care and buying books. Others used it for savings (8%), clothing (3%) or to build their own house (8%). Still, 22% needed the money for housekeeping (day-to-day expended on food and utilities). Probably the best performers, 5% of the group (or 7 farmers in total), earned so much money that they were able to buy a vehicle.

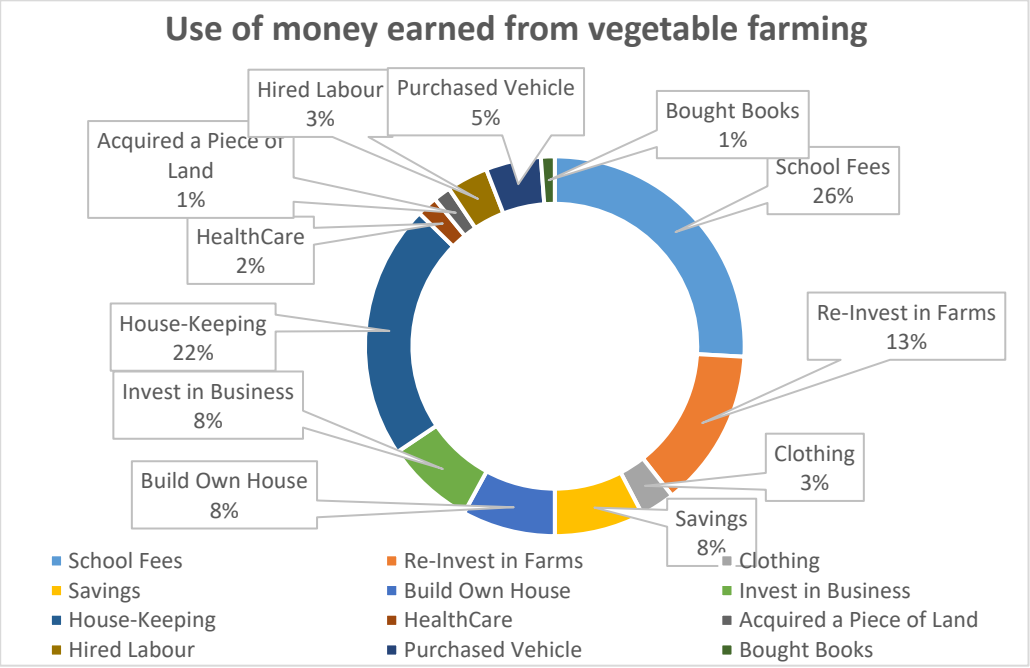


Figure 10 *Application of the money earned from vegetable farming*

Farmers were also asked on the priorities for a possible 2nd phase of GhanaVeg. Interestingly more than 80% mentioned three things: irrigation, inputs and finance. These are exactly three of the most important issues that HortiFresh (the successor of GhanaVeg) will focus on. Figure 11 below shows these farmers' priorities.

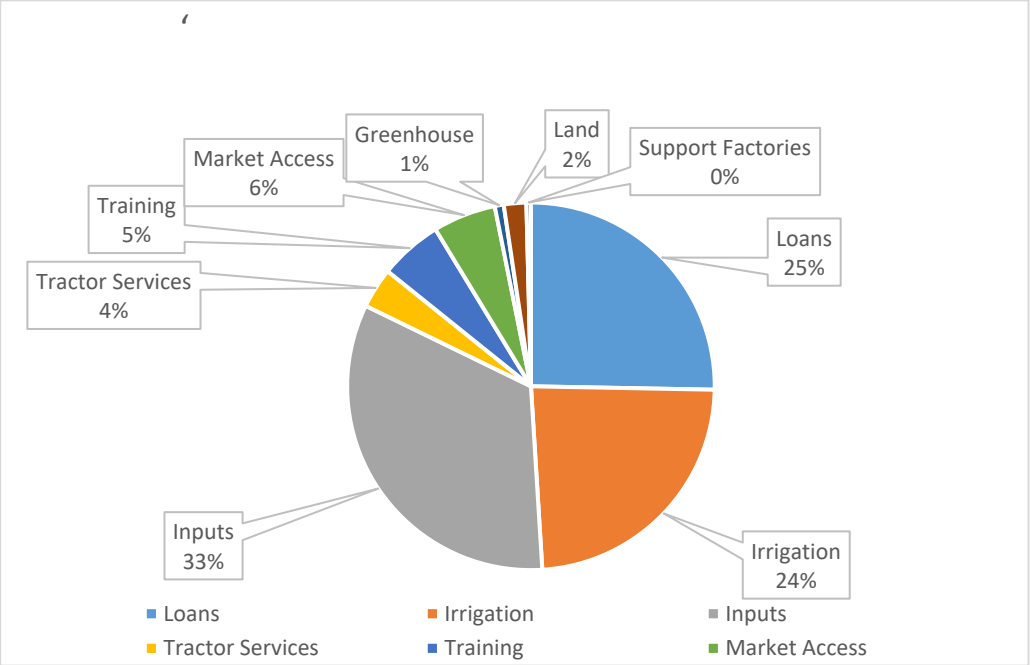


Figure 11 *Important issues for a future GhanaVeg programme*

3.6 Stories from the field

AB Farms: From Fear to Fame

Mr Abraham Agbesi is the Managing Director of AB Farms. He was introduced to GhanaVeg by Mr. Samuel Tackie, the founder and first president of the Ghana Association of Vegetable Exporters (GAVEX). Mr. Agbesi was a sales officer at Srighan farms and started for himself in 2012 focusing on the production and export of vegetables. His business grew gradually, but three years after the start of his company the sector was hit by an export ban from the European Union. Still, he saw many opportunities to stay in the business and expand his export volumes.

After the regular process of concept note and full proposal development, the project idea of AB Farms was approved by the independent grant selection committee. The proposal focused on the development of a professional pack house, an outgrower scheme and GlobalGAP certification. In the first phase AB Farms prepared eighty acres of land where he cultivated okra, beans and tinda. Rigour, dedication and hard work characterized the implementation of his project. During the period of the EU ban AB farms was at the forefront of implementing the new measures, putting in place a tracking and tracing system and implementing field trials for the control of false coddling moth and trips. After the ban was lifted (December 2018), AB Farms became the first company to resume export of chillies to the EU (January 2018). Already, the company has since exported over 520 tons of various vegetables to the EU without a single interception. As such AB Farms also received the GhanaVeg Award for Most Sustainable Business.

The main achievements from the GhanaVeg co-funding grant were:

- AB Farms has been able to increase his and his outgrowers' yields from 0,9 ton/acre to 3,2 ton/acre over the three-year period.
- The company now offers employment to at least 35 women, most of them nursing mothers with school-going children.
- AB Farms' employees and outgrowers have undergone a full training on Ghana Green Label and GlobalGAP. The company is in the process of attaining GlobalGAP certification.
- The company developed a PPRSD approved packhouse, fully furnished office and production sites with irrigation.
- Importantly, AB Farms has learned how to manage his business and organize his production planning, the first chilly export in 2018 being a case in point. "We have developed the culture where every production cycle is regarded as a project, with clear milestone and deliverables from start to finish".

Photos 1 and 2 *Mr. Agbesi with his first exports of chillies to the EU in 2018, and receiving the GhanaVeg Award for Most Sustainable Business from the Netherlands Ambassador, H.E. Ron Strikker, in the presence of the Minister of Food and Agriculture, H.E. Dr. Owusu Afriyie Akoto*

The Story of Raymond Vuomile – How a Biomedical Engineer Became a Farmer

Quite a number of initiatives got started without any financial support from GhanaVeg. These initiatives were initiated because of the intensive communication activities of GhanaVeg (see also Chapter 9). One example comes from Mr. Raymond Vuomile, who was born in Nandom, in the Upper West Region of Ghana. Raymond is an unlikely candidate for becoming a vegetable farmer as he completed his BSc in Biomedical Engineering in 2013 and started his carreer at the Clinical Engineering Unit of the Northern Regional Hospital, and later started his own consultancy company to provide installation and management services for medical equipment to hospitals in the Northern and Brong Ahafo regions.

However, Raymond wasn't content in the medical sector and experienced challenges with the bureaucratic nature of the sector. So, when Raymond saw the GhanaVeg Cook Show, on vegetable production, he thought of "doing something useful and move into farming". Through GhanaVeg he came in touch with Mr. Zakari Musah, lead agronomist of Tikola Limited, to discuss his intentions. His meeting with Mr. Musah provided him the needed advice including crop and variety selection, land preparation and pest and disease management. Raymond chose to cultivate cucumbers and Tikola provided the seeds and after sales support. One year into his production activities, Raymond became the talk of town and he has become the focal person for technology and knowledge transfer to fellow farmers within the Kintampo area. Raymond has inspired many farmers and his farm has become a demonstration and training ground for Tikola. Raymond learned much in the last year: "The challenges of farming are very clear to me, and the weapon to deal with these challenges is in the humility to learn and the enthusiasm to keep going".

Photos 3 and 4 *Mr. Vuomile at his cucumber farm in Kintampo, being used as a model farm*

4 A competitive high value vegetable sector

4.1 Introduction

A number of indicators that measure the competitiveness of Ghana's vegetable sector have already been presented in Chapter 3 on the outcomes of the programme. At output level indicators had been formulated to track the competitiveness, such as the number of business deals, dedicated chains developed and number of interceptions in the EU market, as well as the links created with Dutch companies and the number of trade missions organized. In addition, this chapter describes the Business Opportunity projects that contributed to the increased competitiveness of Ghana's vegetable sector.

An important proxy indicator for the increased competitiveness is the number of dedicated chains that were developed as a result of GhanaVeg activities. These initiatives were either a result of the Business Platform and Trade Fair meetings, or incorporated in the GhanaVeg projects. In total 71 of these dedicated chains were developed, Figure 12.

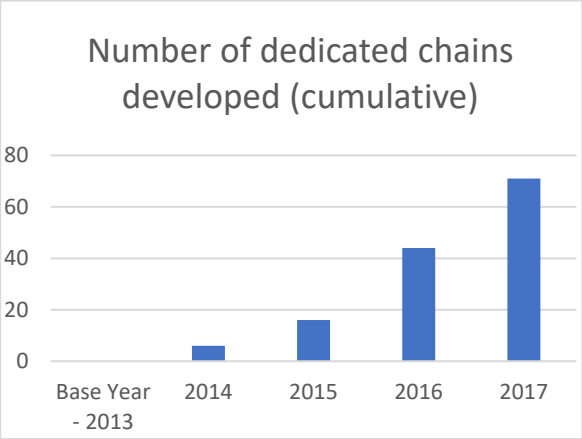


Figure 12 *Number of dedicated chains developed as a result of GhanaVeg activities*

Examples of dedicated chains include the outgrower schemes of AB Farms, Agri Impact, Eden Tree, Joekopan, Kukobila, Quarco, Touton and VoltaVeg initiatives. Each of these companies works with a group of farmers, which it supplies with quality inputs while also being the off-taker of the final produce. Other examples are business partnerships between Tikola (seeds) and Sunripe (water melon juice production) in which Tikola provided the seeds and Sunripe worked with a number of farmers on water melon production. In total 27 of these dedicated chains were developed under GhanaVeg surpassing the target of 20 of these arrangements.

In addition to these dedicated chains a number of B2B deals were generated as a result of GhanaVeg activities. Their total is around 400 while 200 was the target. These B2B deals include the sales of seeds by GhanaVeg partners like Tikola to GhanaVeg members, the sales of produce by farmers and SMEs (like Lubok and ACSL) to Farmers Market and Eden Tree. B2B deals were estimated through a survey at one of the exhibitions (in 2015) as well as through the individual reports of companies (i.e. the partner projects).

With respect to the Dutch companies a total of 14 companies were supported to start or expand their business in Ghana. We did this through trade missions and trade fairs. The companies include: EOSTA and OTC Holland (organic F&V), Bakker Brothers, Bejo, East West, Enza, RijkZwaan, Suba, Syngenta,

Takii (vegetable seeds), GreenFresh (organic herbs), Delphy (consultancy), Celtic (cooling systems), Amatrex (machinery).

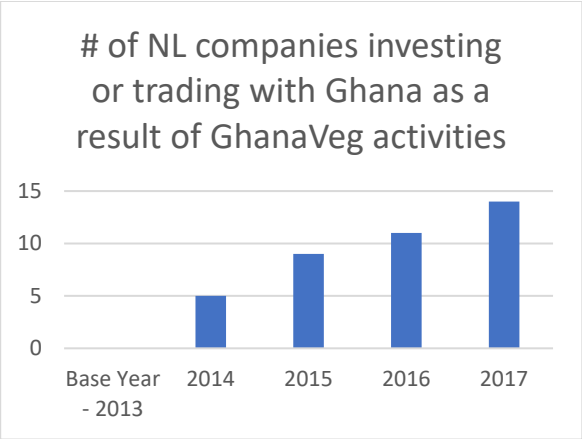


Figure 13 *Investments and trade from Dutch companies*

4.2 Business Opportunities Fund

4.2.1 AB Farms

AB farms received co-financing support from GhanaVeg to introduce high yielding okra and tinda varieties for export, maintain quality and consistency of export and domestic supply, increase net and foreign earnings for the company and its outgrowers and build a packhouse and office to facilitate smooth exports of vegetables. The collaboration led to the construction of a packhouse furnished with basic equipment to facilitate the sorting, grading, washing and packaging of the products. An important result of the collaboration was the increase in yield from 4,5 t/ha to 7,5t/ha. This was assisted by the company's recruitment of a dedicated agronomist overseeing the farm's and outgrower activities. The company increased its number of outgrowers to 50 from 0 and provided the outgrowers with training and a regular supply of inputs. Outgrowers now produce a rotation of okra, tinda and eggplant. These activities tripled the revenues of the company. For products that do not attain export quality AB farms found buyers in the domestic market especially for okra and eggplant. A significant lesson learned by the company is to intensify field trainings and coaching for its outgrowers. In addition, the project led to the introduction of sound record keeping monitoring production, postharvest management, and packaging which are essential for the further expansion of the business.

4.2.2 Agri Commercial Services Limited (ACSL)

The project with ACSL was an R&D project, with Crop Research Institute in Kumasi, that focused on the testing and release of a number of local varieties of tomatoes and garden eggs. The innovation was both technical and institutional, as varieties were intended for exclusive licensing to the company (for a number of years). Main traits of the varieties included: high pest and disease resistance, high-yielding, while still being open pollinating varieties. The project successfully isolated three varieties of open-pollinated tomatoes and chillies for release and commercialization. At the moment of writing these varieties were included in the national variety release process (intended for registration). Through the support of Syngenta the main tomato breeder of CRI was able to get a scholarship from the Syngenta Foundation to pursue his PhD. Also, 85 farmers were trained in nursery and transplanting practices in the Akomadan area.

4.2.3 Eden Tree Limited

Eden Tree received co-financing support from GhanaVeg to increase its own sourcing through the engagement of an outgrower scheme supporting them with training, inputs, a contractual agreement and Ghana Green Label certification. As a result the company now works directly with 110 farmers, out of which 20 women farmers, that have increased their yields by more than 50%. This has positioned the company achieve increase in yield and quality produce from 4,5 tons/ha to 10,0 tons/ha. Furthermore, through the support of GhanaVeg, Eden Tree has been connected to 5 other SMEs that supply the company on a regular basis (e.g. ACSL and Agri Impact). Lessons learned are that for year round production, apart from river water, a borehole is necessary at the nucleus farm. In addition, the company will intensify its on-field agronomy trainings for outgrowers. A system of bonuses was introduced to incentivize the best outgrowers (in terms of quantity and quality). Also, the company will continue to engage its own agronomist and additional hired labour to demonstrate good agricultural practices at its nucleus farm.

4.2.4 Joekopan

The 2 year EU ban placed on selected vegetables in 2015 got Joekopan severely affected as the company's primary activity was the export of chillies, eggplants and gourds to the EU. This affected around 90% of the total revenue of the company. While still having its strong network of outgrowers it needed to venture into a new export crops, which it found in okra and yard-long beans. At the same time the company realized that business as usual was not sufficient anymore, and it needed to invest in certification (GlobalGAP) and better pack house facilities, for both the nucleus farm and outgrowers. In addition, the company found a domestic market for okra (the *okro* type), which further spread risk for the company. A packhouse has been built to take care of sorting, grading and cleaning, as well as phytosanitary inspections. At the time of writing the company acquired GlobalGAP certification for both its nucleus farm (option 1) and its 73 outgrowers (option 2: group certification).

As part of the support Joekopan collaborated with the University of Ghana and designed an outgrower training program. The training focused on pest & disease and postharvest management. In addition, an external agronomist from Kenya was contracted to support the training activities and experiment with new varieties and agronomic practices. The company further adopted the The company further adopted the use of tower irrigation technology and the use of hybrid vegetable seeds, both on the nucleus farm and that of the outgrowers. Through the project the company has now appointed a fulltime agronomist (who participated in GhanaVeg's training of trainers) who continuously trains the outgrowers focusing on increasing yields and quality. Joekopan received the Best Vegetable Exporter of the Year Award in 2016 and the GhanaVeg Award for Best New Product- Export Market in 2017.

4.2.5 Syngenta

The main objective of the GhanaVeg project with Syngenta was to increase the demand for high quality and high yielding tomato varieties. The R&D project focused mainly on the evaluation of six Syngenta tomato hybrids. For the project four locations were selected: Pwalugu, Wenchi, Greater Accra and Torgorme. At these sites stability and adaptability trials were undertaken. The majority of the varieties proved to be too disease susceptible, though at Pwaluga one variety attained a yield of 23 tons per hectare; which is three times the national average. Syngenta is continuing its research in Ghana, the results of which are also ploughed back to its breeding department in the Netherlands.

4.2.6 Tikola/EWS

Tikola, the local distributor of East West Seeds, was involved in two projects with GhanaVeg. In each of the projects the major emphasis was on demonstrating new varieties to farmers (through demonstration sites) and a large number of trainings (often organized at the demonstration sites). The trainings were comprehensive and included all aspects of vegetable production from raising seedlings, to fertilization and pest and disease management. Farmers involved also received free sample packages of seeds (of a variety of crops). In total Tikola trained 1.400 farmers and organized more than 20 demonstration sites. As a result of the trainings around 1.000 farmers achieved a yield

increase of more than 50%. In addition, the company was able to expand its network of agrodealers, selling its seed, in the Northern Regions, Western Region, Central, Eastern and Volta Region. Tikola now employs two fulltime agronomists that support its demonstration and promotion activities. Over the four period the turnover of Tikola in Ghana tripled.

4.2.7 Tacks Farms

The main objective of the project with Tacks Farms was to increase the annual production of herbs from 2 tons to 90 tons, and starting the exports of fresh herbs to the Netherlands. Partly this was planned at the own nucleus farm and partly with surrounding farmers. As a result of the project activities (that were not fully implemented due to a lack of co-financing capacity of the company), the production capacity of herbs increased from close to zero tons per month to 2,5 tons per month at the end of 2017. This has resulted in an increased revenue from US$1.000 to US$ 5.000 per month for the company and its outgrowers. The company was also able to revitalize its cool truck. The project supported the company to co-finance spare parts for the repair of the cold truck, the purchase of irrigation equipment and training of farmers. The company has established itself as a modest supplier of herbs to the local market, restaurants and hotels in Accra while ceasing further export ambitions.

4.2.8 Touton

Touton is one of the bigger exporters of cocoa working intensively in the Western Region and Brong-Ahafo of Ghana. The objective of the project was to assist cocoa communities diversify their income with vegetable production. As such vegetables can supply additional income during the low season (before and after the harvest of cocoa beans). The project operated in the communities of New Edubiase, Sunyani, Ataase and Kasapin focusing on the introduction of cabbage, cucumber and carrots. As a result of the project activities around 500 farmers became engaged in vegetable production. The biggest success was the production of the Oxylus (Seminis) variety of cabbage which doubled yields per acre. One of the Touton farmers in Kasapin, Kwame Yroko, during the dry season of 2017 made about US$ 4.000 dollars with the production of cabbages. Touton supported the farmers with access to inputs and trainings. For the trainings it developed three self-explanatory manuals, that describe good agricultural practices. The company is looking at developing new modules to train farmers on financial management. Another significant achievement is the establishment of a 'zero energy cooling chamber' for short-term storage. Furthermore, Touton purchased a number of tricycles which are used to transport vegetables to conveying points for off-takers to reduce postharvest loses. Lessons learned are the need to intensify trainings for youth entrepreneurs who can take up spraying activities for farmers for a fee. The company will further work on this also including women and youth in its activities.

Photo 5 *Dedicated cold truck of Touton to buy and market vegetables of outgrowers*

4.2.9 Linkougud

Linkougud is an irrigation supply company and had its project proposal approved under the Innovative Irrigation Call for Proposals. The project focused on improving extension services to 75 smallholder vegetable farmers, while establishing two water basins in the Eastern Region, as well as introducing solar pump irrigation for ten smallholder farmers. One of the major achievements of the project is the construction of a rain harvesting pond at Ottorperkrom, capable of holding nine thousand cubic meter of water, for year-round vegetable production. Prior to the project there were ten farmers being involved in Linkouguds activities, while after the construction of the pond 50 farmers benefited and increased their yields by more than 50%. In addition 104 farmers received training and benefitted indirectly from the project, out of which 45 women and 30 youth. In addition, out of the 50 farmers at the water collection site, 44 farmers were certified with Ghana Green Label. The company is now also working on contractual agreements with the farmers to ensure greater commitment from their side. Lastly, the company had two new trade deals (sales of irrigation equipment) as a result of the GhanaVeg activities. The main lesson was that implementation of one site took longer than expected, due to the delay in land development as well as farmer organization and training. As a result, the project didn't embark on the second site, but completed the first site adequately (and without additional finance from GhanaVeg).

4.2.10 Quarco Initiatives

The objective of the project was to establish a nucleus farm and outgrower scheme for the production of organic herbs for export, especially basil through a new, environmentally production system. In the project the company collaborated with a Dutch expert to train workers in the use of simple technologies for the production of compost. The supply of the compost is intended for the 110 acres of land of the nucleus farm and outgrowers. In total 18 outgrowers have received intensive training on the production of organic herbs. In addition, the company developed an innovative way to provide shade for the herbs by growing passion fruit as a shade crop. Apart from the composting and shading innovations, the company installed a system of micro sprinklers to irrigate the herbs and passion fruit seedlings. As such the company has showcased a completely new organic production system of passion fruit and herbs. It is expected that the company will export its first shipment of organic herbs to the Netherlands (GreenFresh) by October 2018. The project delayed because of limited management capacity at the site in Torgorme, and growing uncertainties about the Torgorme irrigation scheme rehabilitation works.

4.2.11 Wienco

The project successfully collaborated with the Crop Research Institute (CRI) in Kumasi to develop disease resistant pepper seeds (new Cayenne type of chilli) at Akomadan in the Brong-Ahafo Region. The project resulted in the production and demonstration of a new variety called 'Shito-Adope'. Now, the product is packed in 50 and 100 gram sachets for sale to farmers. The project also supported farmers with agronomic trainings: nursery management, pest and disease control, post-harvest management and the establishment of demo fields to try out and promote the new variety.

4.3 B2B Activities: Trade fairs and trade missions

GhanaVeg, with the support of NABC, organized five incoming trade missions to Ghana (one more than planned). These took place in 2014 (2), 2015 (1) and 2017 (2). On average 5 companies participated per trade mission (with some companies joining two trade missions). The following Dutch companies participated in the trade missions to Ghana: AgriBSA, Amatrex, Bejo, BIO Invest, Delphy, East West, Celtic, Eosta, Enza, Ferm o Feed, Frugiventa, Green Farming, Kramer, Omnivent, Suba Seeds, Supermaritime, Takii, Topsector T&U, Unitherm. The introduction to this chapter highlighted the companies that started or expanded business with Ghana. In addition, GhanaVeg supported the participation of GhanaVeg network members for three other trade mission from Ghana to the Netherlands that were financed through RVO (in 2015, 2016 and 2017).

In addition to these events NABC also organized a host of events in the Netherlands to present the business opportunities in Ghana's vegetable sector, these included:

- A seminar at the Tuinbouwcontactdagen in Venlo in February 2015 in which around 27 Dutch companies participated.
- Greentech Agricultural Trade Fair Amsterdam: the incoming Ghanaian study tour attended a seminar on 'international partnerships and doing business in Ghana & B2B Matchmaking with 16 Dutch companies', June 2016.
- Brochures and discussions during the Afrika dag and Africa Works conferences in 2016 and 2017. Regular articles and messages in the bi-weekly NABC newsletter, as well as articles in AGF Actueel Magazine (2) and Groentenieuws.nl (1). Articles were also published through the newsletter of the following Dutch sector associations: Topsector TU, FrugiVenta and Plantum.

GhanaVeg organized three (fruit and) vegetable fairs, these took place in May 2015, June 2016 and June 2017. Attendance of the fairs grew in number from a modest 20 exhibitors in 2015 to more than 60 in 2017. All the three fairs were well attended, with seminars and matchmaking sessions to further boost participation. The fairs proved that there is a need for this type of specialized fair and this will be continued in the HortiFresh phase.

Main lessons learned from these activities are:

- There are not many companies that want to *invest* in the production and exports of vegetables from Ghana. Unlike countries in East Africa the conditions in Ghana (at this moment) are not conducive for Dutch companies. Main challenges include: a hot and humid climate, land availability, high interest rates and labour costs. The majority of Dutch companies that are interested to trade with Ghana supply inputs (seeds, fertilizer) or cold storage facilities, or want to source organic products (herbs, fruits and vegetables).
- The GhanaVeg trade fairs were very successful and attracted a lot of participants. Also a number of trade deals took place at these fairs, and combining the trade missions with the trade fairs proved beneficial. Other fairs like AgroFood and FAGRO were less interesting; either being to broad in scope (AgroFood) or too small with limited promotion activities (FAGRO).
- A number of Ghanaian companies that linked up with Dutch companies (as potential agents or distributors) underperformed after the trade mission left. It is a lesson for HortiFresh to be even more selective in checking which companies can genuinely deliver (before linking them to the Dutch companies).

4.4 R&D Innovation Fund: Road Map for Pest Control

Under the GhanaVeg R&D Innovation Fund the University of Ghana's College of Basic and Applied Sciences was supported to develop a Road Map for Pest Control. The University got support from a researcher from Uganda's National Agricultural Research Organization in Kawanda (Dr. Caroline Nankinga); as Uganda had faced similar phytosanitary problems as Ghana (including a ban). The project consisted of the development of a Road Map for Pest Control, focusing on basic farm management practices to control pests like: trips, white fly, fruit fly and false coddling moth. The Road Map was launched by the Minister of Food and Agriculture, H.E. Dr. Owusu Afriyie Akoto in June 2017 (see also Appendix 1 GhanaVeg Publications). The Road Map was later hailed by the second EU FVO Mission (November 2017) that assessed Ghana's implementation of key phytosanitary measures. In addition to the Road Map, this project implemented demonstration trials at more than ten export farms (all during the period of the ban) to showcase integrated pest management practices. Together with the Road Map and the work at the airport (see Chapter 8 on enabling environment) this all strongly contributed to the lifting of the ban starting in January 2018.

4.5 R&D Innovation Fund: Okra and curry leaves

The main issue with the export curry leaves concerned the citrus greening disease. A disease especially prevalent in citrus plantations, which can spread to the curry leaves. There is a sizable demand for curry leaves from the United Kingdom. During the visit of EU FVO audit team, they met with the director of the PPRSD and explained the need to do research in the five major citrus producing areas of the country. The research focused on soil analysis to ascertain the deficiency causing the greening of the citrus leaves. The EU team explained that the pest to look for is *Psyllids* spp *condidatus Liberibactor* spp, which is responsible for the citrus greening disease. The strains of the pest needed to run all the tests in the lab to compare the results. Also, sticky traps which were set on the curry leaf farms so as to identify whether the pest was present. Based on these results targeted interventions can be made to tackle the pest and ensure both citrus and curry leaves can be grown free of pests.

The demand for Okra in both domestic and international market is high but little information was available on well-adapted varieties and pest and disease management. The study demonstrated best pest management practices, best performing varieties and developed a manual for commercial okra production. The performance of four exportable okra varieties Indiana, Clemson spineless, BEJO 3129 and Asontem, a local variety, were evaluated. Regarding pest management, the following insecticides were evaluated: Viper®-Acetamiprid 16g/l + Indoxacarb 30g/l -40ml /15L of water, Neem Extract - 50g/L of water, Bt insecticide-Ecopel®- 20g/15L of water, and water treatment as control. This was done at Bowkrom and Torgorme, during the minor season from August 2017 to May 2018. Viper was the most effective followed by Neem and Bt. At Torgorme, in the minor season fields with yield ≥7.0t/ha was from Clemson spineless, Indiana and Asontem treated with ANKE, Viper and the control whereas at Bowkrom, Asontem treated with Viper recorded the highest yield of 5.2t/ha. 2.8t/ha from Asontem treated with ANKE. Dry season yields from Torgorme were better than Bowkrom. These results were incorporated into an Okra production manual (the first in Ghana) and shared with GhanaVeg network members.

4.6 Consultancy Fund: Business Opportunities and Export Reports and IFPRI's Competitiveness Study

At the start of GhanaVeg a report on the Export Vegetable Sector in Ghana was comissioned. Together with the study on Sanitary and Phytosanitary Issues and Greenhouses, this was later merged into a Vegetable Business Opportunities Report of Ghana. The first copy of the report was handed over to the Minister of Food and Agriculture, H.E. Fifi Fiavi Kwetey, by the Netherlands Ambassador to Ghana, H.E. Hans Docter, at the December 2014 Business Platform. An updated version was published in 2016 and presented to the Minister of Food and Agriculture, H.E. Alhaji Mohammed Muniru, by the Deputy Ambassador of the Netherlands to Ghana, H.E. Caecilia Wijgers. The report has been printed more than 1.000 times and has been widely used by the vegetable community in Ghana.

In the last year of GhanaVeg another study was commissioned to more profoundly look into the competitiveness of three vegetable crops: eggplants, onions and scotch bonnet chillies. The focus was on those crops because their imports seemed to increase and production issues were surfacing in important hotspots. The study confirmed the problems that Ghana is still facing in terms of production and marketing, showing that vegetables can be very profitable but that the availability of key inputs is limiting and that the entry to market networks is restrictive. The study significantly informed the proposal of HortiFresh, which will focus more strongly on ensuring availability and uptake of high quality inputs and developing alternative market structures.

4.7 Stories from the field

Kwame Yroko, a farmer supported by the Touton project

Kwame Yroko is a cocoa farmer from the Kasapin community in the western part of the Brong Ahafo region. He was introduced to Touton to start production of cabbages. He engaged in a training organized by Touton production but had challenges in finding start-up funds. In this instance Touton helped out and provide Kwame with a loan agreement that included inputs like seeds and fertilizer. In the first season Kwame started with an acre of cabbages; implementing all recommended production protocols, receiving training from Touton's dedicated field agent. The main 'trick' proved to be growing in the lean season using the right variety (Oxylus of Seminis), which ensured a high market demand at the time of harvest. Kwame sold his cabbages to the market women in Kumasi (Abinchi market) and made a profit of about US$ 4.000. Kwame has now decided to venture into vegetable farming as his primary business, while cocoa remaining the family business for the future. As a result of his increased income, Kwame was able to build his own house with proper roofing and also the childrens' school fees are now less of a burden. "The advantage of growing cabbages is that you can harvest them every three months; instead of having one harvest per year I have four now!". His plan for the future is to establish a good production planning with his buyers so that he can further expand his volume of production.

5 A vegetable sector driven by innovation

5.1 Introduction

For the Ghanaian vegetable sector to thrive, increasing the innovation capacity is key. This includes new technologies, like seeds, crop protection products, fertilizers and irrigation equipment; as well as innovative services that assist farmers with latest information on agronomic practices and market developments. GhanaVeg supported a number of innovations for the sector, and assisted companies in scaling up their sales of innovative technologies. This was done through a combination of activities, ranging from studies and reports to provide an evidence base for the potential benefits of new technologies to calls for partnerships between companies and researchers to test new technologies under farmer conditions. Some of the results of these activities are presented in the figures below.

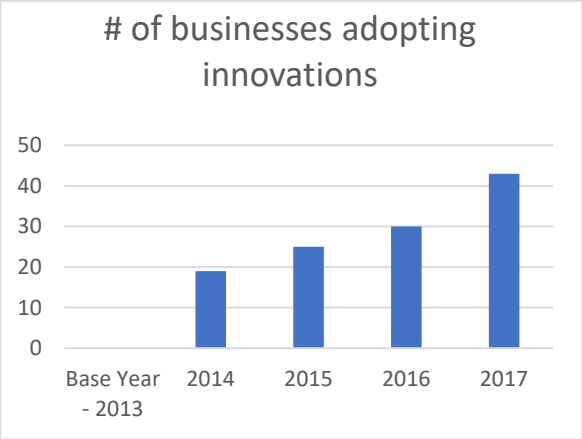


Figure 14 *Number of businesses adopting innovations / investing in new technologies*

In total GhanaVeg contributed to 43 businesses adopting innovations, exceeding the target of 30. These innovations include the uptake of professional nursery practices (using seed trays and a sterilized medium), solar irrigation technology, farm planning (with proper rotation, right spacing and row planting, and trellising), and introduction of new crops (sweet melons, musk melon, curry leaves). The innovations were partly implemented by the project partners (receiving grant funding), but also through the agronomy trainings (see chapter 6 on sustainable production).

5.2 R&D Innovation Fund

The Research & Development (R&D) Innovation Fund was established to addresses the research gaps existing in the vegetable sector; moving from 'business as usual' to a more demand-driven research agenda. The fund worked both ways: researchers could be in the lead working with companies to bring on-the-shelf technology to the market; or companies would lead in engaging researchers to help them test their products. Though meaningful results have been achieved in this component, the overall response for the R&D Fund was less pronounced as for the Business Opportunities Fund. This partly had to do with the limited availability of market-ready innovations developed by Ghana's research system, and partly by the lack of research focus of the majority of Ghanaian vegetable companies (and their understanding that implementing research took too long for them).

Still, eleven projects materialized, mainly focusing on: developing and registering new vegetable varieties, introducing new crop protection and irrigation products.

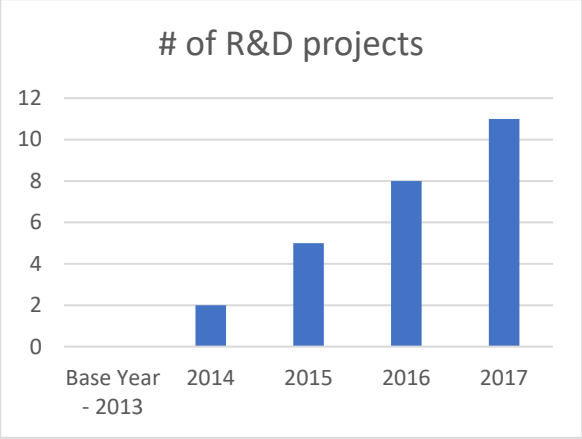


Figure 15 *Number of R&D projects carried out on behalf of the private sector*

In total 11 R&D projects were supported (under the R&D Innovation Fund), carried out on behalf of the private sector; 2 short of the target of 13. These projects were:

- ACSL: Developing new pepper and eggplant varieties (with CRI)
- Wienco: new pepper variety production and marketing (Shito Adope, with CRI)
- Dizengoff: new greenhouse testing with cost-benefit analysis (with CRI)
- Syngenta: Screening new tomato and pepper varieties (with WACCI)
- GreenOK: introducing a new organic fertilizer to Ghana (with SARI)
- RealIPM: registering three new biologicals for pest control (with UoG)
- Srighan: combating false coddling moth with IPM (with UoG)
- Okra project: Testing new okra varieties and management practices (seed companies with UoG)
- Butternut & Curry Leaves: increasing shelflife and controlling the citrus greening disease (Kukobila with UoG)
- Development of a Road Map for Pest Control (UoG)
- Collaboration with the Food and Drug Authority for monitoring pesticide residues in market outlets (FDA)

Overall, from the companies' side, there was greater interest for the Business Opportunities Fund than for the R&D Innovation Fund. Especially the 50% co-financing proved difficult for them, and also a number of researchers were less 'service oriented' than initially envisaged. Therefore, four 'independent' R&D projects were developed with a greater role for GhanaVeg and the research institutes; these are the last four in the list above focusing on alternative export crops, the pest control road map and the collaboration with the FDA.

The most notable success story of these five projects was that of Agri-Commercial Services, which succeeded in isolating three varieties of open-pollinated tomatoes and chilies. The three varieties have been successfully tested and are now being put in the registration process of the Ministry of Food and Agriculture. Another positive example is GreenOK, a Ghanaian company that promotes an organic fertilizer from Europe. Apart from successfully testing the benefits of the product in Northern Ghana, the company managed to attract 5.000 farmers to its demonstration fields, and as a result it increased sales to smallholder farmers in that area. Wienco Ghana Ltd collaborated with Crop Research Institute (CRI) in Kumasi to develop and release a disease resistant chilli variety, support farmers with knowledge and skill training in an effort to improve their livelihoods. In the end the well-adapted and popular market variety 'shito adope' was released and made available in 50 and 100 gram packs for sale through Wienco's (now RMG) market outlets.

5.3 Consultancy Fund – Greenhouse

Two of the Consultancy Funds were dedicated to study the business opportunities of 'protected cultivation' in Ghana. When GhanaVeg started protected cultivation was still small in Ghana, with just a few 'tunnels' and 'envirodomes' being tested. However, during the course of the programme the private as well as the public interest increased combined with substantial funding through development projects. For GhanaVeg it remained a difficult topic throughout the duration of the programme, as the number of failures exceeded the successes.

The role we took up was more as an information provider, looking at the evidence of effective designs and management practices; staying away from being involved in funding major (new) initiatives. The commissioned studies found that the available greenhouse and tunnel designs were largely not suitable for the hot and humid climatic conditions present in Ghana. In addition, another study ('Cost-Benefit Analysis of Greenhouses') found that smaller greenhouses (e.g. the 240m^2 tunnels) – even with the best management - can hardly be made profitable. This is because the high basic costs for the pump and irrigation system and necessity to have a generator, as well as high salary costs for a farm manager. The study concluded that greenhouse cultivation should start at 2.000 m^2 and preferably at 5.000 m^2, to accommodate for all the specialized labour and technology required to make it a success. In the new HortiFresh programme we are now working on such a greenhouse model (within the financial products component).

In the end, GhanaVeg was successful in bringing the much needed common sense and level-headedness into the greenhouse discussions, that before were largely guided by wishful thinking. We contributed to the debate by inviting experts from the Netherlands and organizing discussions both at the Business Platforms and Trade Fairs. As a spin-off two RVO projects were developed; one by WUR and Agri Impact focusing on measuring climatic conditions in existing greenhouses, and one by Delphy (forthcoming) on developing a new greenhouse for Ghana with Dutch technology. In addition, one of the GhanaVeg network partners (not being a grantee) independently decided to start greenhouse production based on the first Greenhouse Study report. This company called Nesher Farms selected better (Israeli) greenhouses and a more appropriate location for his greenhouses (Shai Hills), and has been one of the more successful greenhouse growers.

5.4 Business Platforms & Roundtable Meetings

The Business Platform Meetings and Round Table Meetings served as the main visibility instrument of GhanaVeg. The fora attracted participants that ranged from small-and medium enterprises to larger multinational companies, and key representatives from government, research institutions and NGOs, as well as young entrepreneurs exploring business opportunities in the sector.

A total of twenty Business Platform Meetings were organized across the country over the four year period. There were four in 2014, six in 2015, four in 2016 and two in 2017. Four meetings were organized outside of Accra: two each in Kumasi and Tamale; these took place in 2015 and 2016. Because attendance gradually increased over the years, we decided to organize less meetings in 2017 and rather focus on the organization of a specialized vegetable trade fair (with seminars) to accommodate the larger audience, while zooming in on particular issues in more dedicated Round Table events (based on invitation only).

The attendance of the Business Platform meetings were encouraging and sometimes overwhelming over the period. The feedback that was received from our network, which was collected through surveys and interviews, found that especially the networking highly contributed to commercial transactions and recruitment of staff. This also formed one of the most important reasons for participants attending subsequent meetings. In addition, the participants appreciated the level of information provided and the knowledge shared; the selected topics were seen as useful and relevant. This especially concerned the Business Platforms and Round Tables that discussed: the export ban (including pest and disease management), greenhouse technology and access to finance.

The Roundtable Meetings mainly targeted the emerging issues in the sector. Once it became clear that a lot unclarity or lack of information existed around a certain topic, or when an opportunity was emerging a Round Table meeting was organized. The meetings started in 2016, in which year three were organized, and two in 2017. The Round Table meeting held in April 2017 on the implementation of the Ghana Green Label Scheme saw the highest level of attendance. Often as a follow up to the Round Table discussions bilateral meetings were organized and GhanaVeg activities were funded to address some of the key findings. E.g. after a meeting on the export ban GhanaVeg funded UoG to provide hands-on support to the phytosanitary service at the airport to improve the level of inspections.

The Business Platform and Round Table meetings also served to present a number of business opportunities and business cases, that were developed through the R&D, Business Opportunity and Consultancy Funds. Space was created for individual companies to present their (innovative) products, e.g. a new type of solar irrigation, as well as sessions for matchmaking to allow one-on-one networking between horticulture companies and between companies and banks.

5.5 Business cases

GhanaVeg commissioned studies for specific gaps that need support in the sector. The studies' findings often demonstrated opportunities for entrepreneurs to take advantage of as well as a detailed business cases on how to operationalize the opportunity.

The Business Case for a 'vegetable distribution company with cooled warehouse facilities' showed that there is room for more specialized retail outlets that make use of cold storage technology. This is especially the case because currently postharvest losses are very high in the main wet markets of Accra and Kumasi. Celtic Cooling, a GhanaVeg network member and Dutch company, with presence in Ghana, linked up with this business case and presented its facilities at one of the meetings and showcased it at three fairs.

As mentioned earlier, under the Greenhouse Consultancy Fund, The cost benefit analysis of the Amiran and Envirodome Greenhouse Models studied the performance of these structures. The study found that investments in both (rather small) structures cannot be recovered in the first three years (a negative internal rate of return after three years). Instead, interested farmers and SMEs should focus on larger and higher structures of at least 2.000 m^2.

5.6 Stories from the field

GreenOK – Demand driven research and farmer demonstrations

"As a business entity, having reliable and scientific data for our product was instrumental for increasing the acceptance of our product, and as a result sales", the Managing Director of GreenOK for Africa Annette Kempa tells. She found it challenging to find the right research partner and pay for all the research costs by herself. After having her R&D Innovation project approved by GhanaVeg she could adequately conduct on-field research trials for her product, a new organic fertilizer that has the ability to remain for a longer period in the soil compared to normal compost or organic manure. The project assisted the company to collaborate with the Savannah Agricultural Research Institute (SARI) in Tamale and a selected number of farmers, to validate the quality of the GreenOK products.

The project allowed GreenOK to have accurate data to compare her product to other existing products. The results showed that soils that were treated with her product had higher yields than those that used compost or farm yard manure. As a result SARI provided the certification of the product for use in the market.

The company further demonstrated the difference in treatment at 20 demonstration sites in the southern part of the country, where demand is expected to be higher. In addition, the company engaged a large number of farmers through community radio outreach, field days and trade fairs. The company gave away free samples to farmers for trials on their fields. The company was also able to establish a network of distributors (agrodealer shops), so that the product is easily accessibility for farmers. Through these activities the company reached a total of 5.000 smallholder farmers, Annette Kempa explained: "The independent research shows that our product works, and this will allow us to expand our business and compete for government tenders – as part of the planting for foods and jobs initiative". The company is now looking to increase its reach to other regions, using the proven model of farmer demonstrations, community radio and product availability through agrodealer shops.

Lubok – Boosting productivity and diversifying the product portfolio

Lubok farms has been one of the 'best farmer' awarded companies in the Eastern Region. As part of the Business Opportunities fund the company applied for innovative greenhouse financing. As a result he purchased a new greenhouse with better top ventilation on the Winneba-Mankesim road to produce bell peppers and tomatoes. The farm installed drip irrigation and had already year-round supply of water through its dam and basin.

Importantly, the company engaged an experienced agronomist to support all the specialized practices of the greenhouse. "It is interesting to note that it was through the GhanaVeg Agronomy training that we realised the importance of using seed trays in raising seedlings for production" the Managing Director of Lubok farms, Mr. Luther Botwe indicates. Through the use of seed trays the company was able to increase the germination rate of the (expensive) hybrid seeds, and cultivate strong seedlings.

"GhanaVeg came in the nick of time for the company, especially because we had nowhere else to turn to", Mr. Botwe added. "Not only were we excited about the financial assistance but we also gained immense knowledge on greenhouse production and mastered a way of reducing temperatures in the greenhouses". In addition, we invested in solar panels to lessen the burden of the cost of fuel for the pump that provides the water from the basin. "Now we have the muscle to expand and increase our production". Lubok farms is now a hub for training other farmers in the area as extension agents from the Ministry of Food and Agriculture gather farmers on its fields for training. The company has increased its revenues by 70% and maintains a constant supply to the high-end domestic market.

Due to the success of the project, the company was able to start a new business activity of seed maize production. In 2018 the company started activities on around 100 acres, with the main of supplying the seed to the farmers in his catchment area. The company also registered with the Grains Development Board of Ghana to sell maize seed to farmers outside of the catchment area. Additional investment for this venture came through a Ghanaian-Italian investor. Mr. Botwe got in touch with this investor through the matchmaking activities of GhanaVeg. Now the investor supports Lubok in the expansion of his vegetable and maize seed production activities.

6 Sustainable production

6.1 Introduction

One of the boundary conditions that was determined at the start of the GhanaVeg programme was the necessity for sustainable production both from a food safety and environmental point of view. The most important entry point for the private sector in this respect is the adoption of Good Agricultural Practices (GAP) through certification; combining food safety, environmental protection and profit. In this light, a number of studies were commissioned under the consultancy fund as well as two research projects through the R&D Innovation fund: one with the FDA, a public sector institution, and with RealIPM, a company. During the first year of the programme (2014) it was realized that the agronomic knowledge of staff of companies as well as the public sector was lower than anticipated. Therefore, an Agronomy Training of Trainers (ToT) with e-learning modules was set up to bridge the gap. While initially sustainability also included environmental aspects it became clear that the biggest problems in the sector were on food safety and raising productivity, as such the environmental sustainability received limited attention.

The two main indicators for sustainable production were: (1) the number of EU interceptions due to phytosanitary issues (i.e. the import of harmful organisms); and (2) the number of farmers adopting GAP related spraying services.

The number of EU interceptions was taken as an indicator to show that farmers and traders were following correct guidelines to produce and trade crops free of quarantine organisms. In the first three years, 2013 – 2015 of the programme interceptions were very high and a ban by the EU was imposed for a number of vegetables (Figure 16). The reduction in interceptions in 2016 and 2017 does reflect the reduced exports partly. At the same time export value of vegetables dropped to 30% of the total of the year before, while interceptions were 10% of the year before. This shows that already in 2016 and especially 2017 (with seven interceptions) compliance with EU regulations improved. Now, after the lifting of the ban interceptions remain low and in the period January-May 2018 only ten interceptions were reported, out of which four had to do with incomplete paperwork.

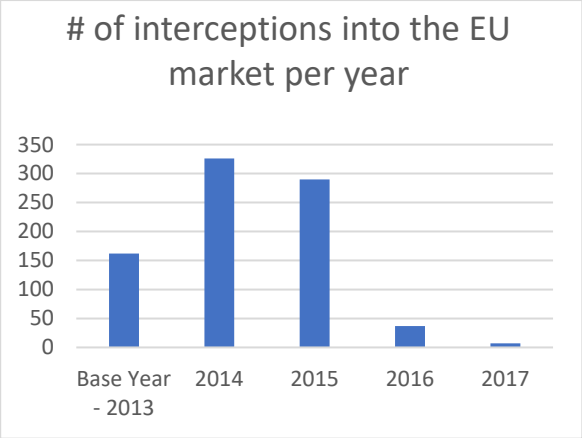


Figure 16 *Number of interceptions related to vegetable exports into the EU market (Europhyt, 2018)*

The second important indicator tracked the number of farmers adopting GAP-related spraying and fertilizer application practices. This indicator reflects both the support given to the Ghana Green Label as well as the effect of the agronomy trainings. In total 8.409 farmers were trained in the judicious

use of pesticides and fertilizers. Out of these 4.533 were reached by the various trainings of the Ghana Green Label initiative, whereas 3.876 were reached through the Training of Trainers (ToT) modules. For each agronomist that took part in the programme another 70 to 80 farmers were trained. As a result, the target of 8.000 was achieved.

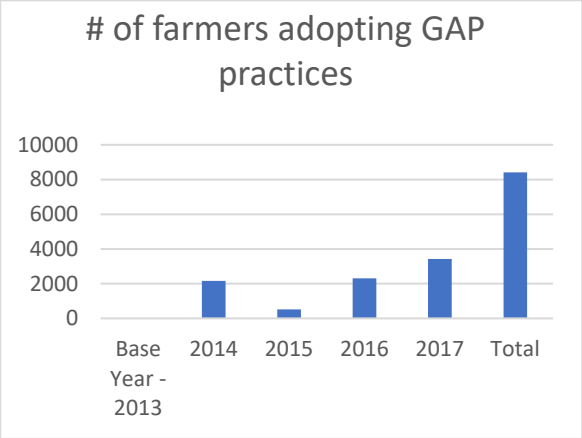


Figure 17 *Number of farmers adopting GAP-related spraying and fertilizer practices*

6.2 Consultancy Fund: Analysis of the Sanitary and Phytosanitary Status of the Vegetable Sector

Ghana is a signatory of the WTO agreement on Sanitary and Phytosanitary (SPS) measures. This international agreement sets out a framework for food safety as well as plant health. While food safety is important for both national as well as international trade, phytosanitary compliance can especially be a big obstacle for international trade. The study, executed in 2014, assessed the food safety and plant health status of the vegetable sector in Ghana, determined bottlenecks and provided recommendations for improvement of the food safety and phytosanitary system of the vegetable sector in Ghana. The report is still used as a reference for improving the phytosanitary system in Ghana. (see also Appendix 1: GhanaVeg publications)

With regard to Phytosanitary issues the ban imposed by the EU for certain vegetables resulted in the establishment of an Export Taskforce (see Chapter 7) and the programme became involved in the Ghana Green Label (GGL) committee (see paragraphs 6.3 and 7.1). In addition, collaboration with the Food & Drug Authority (FDA) to test fresh produce was initiated, as they established a newly formed agro-produce and biosafety department (see paragraph 6.3).

6.3 Consultancy Fund: Ghana Green Label Strategic Plan

The Ghana Green Label (GGL) is an initiative of the Ministry of Food and Agriculture (MoFA), working together with GIZ and the Ghana Standards Authority. GGL is envisaged to become a national mechanism for food safety in the domestic market for fresh fruits and vegetables as well as a baseline standard for exports. The main idea for the program is to get producers to produce good quality horticultural products in a consistent reliable manner by following set standards. However well intended it became clear that uptake of GGL was very low and that without a good strategic direction GGL would remain a in the domain of the public sector and not embraced by the private sector. As such GhanaVeg supported the development of a strategic plan for GGL (Ghana Green Label Strategic Plan 2016 – 2020). This plan guides the GGL committee in its activities and has increased the participation of F&V wholesalers and retailers in the scheme (who in the end should drive the Label).

6.4 R&D Innovation Fund: Pesticide residue analyses

Sampling, testing and analysis of fresh fruit and vegetables on the domestic market for food safety has only been done on a project basis. To kick-start a regular monitoring programme to be executed by FDA and the development of a national monitoring plan, GhanaVeg facilitated a study by FDA. The objective of this study was to ascertain the prevalence of pesticide residues in ten commonly used vegetables in the Accra-Tema Metropolis. At the time of writing FDA has not produced a report yet, due to faulty equipment, which was finally fixed in July 2018. Also the laboratory staff's capacity still needs training. Since monitoring of maximum residues limits (MRLs) in the domestic sector is a priority for ensuring safe fruit & vegetables, it is envisaged that HortiFresh will continue to work with FDA to strengthen their capacity.

6.5 R&D Innovation Fund: RealIPM

Registration of pesticides and especially biopesticides is not straight forward in Ghana, as the requirements posed by the Environmental Protection Agency (EPA) are also substantial for biopesticides. RealIPM, a Kenya based company producing biological control agents for the horticulture sector, is interested in entering the Ghanaian market. Hence, with GhanaVeg support, the renewal of the registration of two biopesticides, and two new registrations were carried out. For the latter the University of Ghana implemented the required trials. The dossiers for all the four biopesticides have been submitted and are awaiting approval from EPA. In addition to the registration obstacles, it is also observed that knowledge of how to incorporate biopesticides in the cropping cycle is weak. To this end, agronomists were trained and field demonstrations organised. Since RealIPM has no base in Ghana, HortiFresh is currently supporting to find an appropriate distributor for their products.

6.6 R&D Innovation Fund: Shrighan Farms

The project's key objective was to conduct field evaluations of new bio-control agents to control False Codling Moth (FCM), and to train lead farmers in the use of the new product. As a result of the project the Environmental Protection Agency of Ghana approved and established the use of Bacillus thuringiensis for variety trials. Trial fields were chosen around: Begroo, Nkruakan and Keta for field evaluation. Three products were tested: Cryptogran, *Bacillus thuringiniensis* and PAWA. 67 lead farmers and agricultural extension agents were trained on the use of these products. Trial results will now be used for the registration of Cryptogran (or Cryptex in Ghana).

6.7 Capacity Development in Agronomy

Target: 50 Trained agronomist who in their turn train on average 100 farmers within one year, resulting in 5,000 farmers trained.

Agronomic modules and e-learning

The GhanaVeg agronomy modules consisted of 5 priority areas namely: transplant raising, fertilization, crop protection, spraying technique and adult learning. The agronomy modules were designed for a training of trainers programme. Training sessions consisted of practical (field) and theory (classroom) sessions. Adult training skills were integrated in the more technically oriented sessions. 50 Agronomists from companies participated in the GhanaVeg activities and completed the training. The training positively impacted the depth of knowledge, skills and confidence of the agronomists because many of them never received an opportunity to have periodic trainings for their jobs. To support the training sessions, e-learning modules were developed and made available (see: https://www.ghanaveg-e-learning.org). About one hundred people accessed the e-learning modules, and finalized at least one of the modules.

Agronomists who participated in the GhanaVeg agronomy training were tasked to relay the knowledge to at least 50 farmers in their network. Reports of 42 out of the 50 trained agronomists were received. The reports show that they jointly trained 3,867 farmers. Out of the 3,867 farmers trained, 2.568 are male, representing 66% and 1.299 are female, representing 34%. 1.818 farmers out of the total figure were youth, representing 47%.

Trainings were conducted in all the ten regions of Ghana (see Table 2 below). The northern region had the highest number of people trained (865), representing 22%. Upper West and Western Region had the second highest number (close to 700) of farmers trained, representing around 18% each, while 148 farmers were trained in the Ashanti Region, the lowest number, representing 3,8%.

Table 2 *Number of farmers trained through Training of Trainer activities*

# OF AGRONOMISTS	REGION	NO OF FARMERS TRAINED			
		MALE	FEMALE	% YOUTH[1]	TOTAL
3	Northern	578	287	86	865
7	Central	257	98	55	355
6	Volta	70	36	50	106
8	Eastern	215	107	80	322
4	Brong Ahafo	238	69	80	307
7	Accra	182	65	65	247
1	Ashanti	130	18	30	148
2	Upper West	373	310	60	683
3	Upper East	132	33	65	165
1	Western	393	276	55	669
	Total	**2568**	**1299**	**47**	**3867**

[1] Youth are here defined as those ≤35 years

Crop guides

GhanaVeg developed ten specialized crop guides that were distributed to the trained agronomists as well as to farmers during field day events. These crop guides are basically pictorial (Figure 18), with few words, to guide growers with basic instructions to produce ten vegetables namely: hot pepper, sweet pepper, African eggplant, eggplant, okra, carrot, onion, cucumber, bushy tomato and cabbage (see Appendix 1). This has proven to be a valuable tool to farmers and home gardeners who are willing to pay for copies of the guides to improve on their practices.

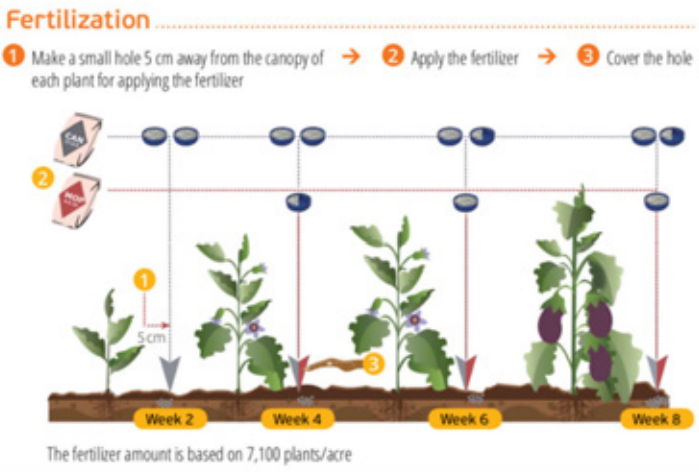


Figure 18 *Example of a pictorial explanation of how to apply fertilizer (from the eggplant crop guide)*

Variety trials

In addition to agronomic knowledge, a lack of varieties suited to the Ghanaian conditions was identified as one of the major bottlenecks for increasing productivity. Farmers often use farm-saved seed, to be used in the next cropping season and rarely invested in new and or hybrid varieties. Variety trials for two vegetables, onion and okra, were financed through project grants. Farmers were invited to the trials during field days. Since these trials were only carried out in the last year of GhanaVeg there is no information yet available on the uptake of these new varieties. It is however expected that these new varieties will increased production together with a more responsible pesticide regime. In total 807 farmers participated in the field days:

- Atomic 'Super' Field Day, organized by the ToT participants 452
- Field days at Legon, onion trials 85
- Field days at Keta, onion trials 60
- East West Seed Field Days, Western Region 150
- Field Days in Torgorme, okra 60

6.8 Stories from the field

Field day on variety trials

A number of field days were organised as part of the onion and okra variety trials; in different locations and also as part of the agronomy training open days. During these field days, farmers, input dealers, marketers and other relevant players in the vegetable sector participated. Evaluations with field day participants were positive. Farmers were generally happy with the information presented and appreciated the opportunity to discuss new growing techniques with WUR resource persons and trained agronomists. They also welcomed the interaction with fellow farmers and agro-input dealers. These field days have been avenues for instant solutions to long lasting queries that some farmers carried with them.

7 A conducive and enabling policy environment

7.1 Introduction

For every sector to thrive and innovate, there needs to be a functional policy framework that is implemented in an effective way. Favourable tax policies, business incentives and proper enforcement of regulations are strong enablers for being competitive in a more and more globalized world. Ghana's vegetable sector suffered many challenges in this respect, ranging from food safety and phytosanitary issues, to a general lack of business incentives. Therefore, GhanaVeg created a platform for dialogue through its Business Platform and Roundtable meetings, as well as its facilitation role in the Vegetable Export Taskforce and Ghana Green Label committee. As a result five policy and regulatory changes proposed by GhanaVeg were effectuated (exceeding the target by one). These changes are:

- Establishment of an Export Taskforce (by Ministerial Directive)
- Membership of a Vegetable Association to be conditional for exporting vegetables (by PPRSD notification)
- The inclusion of a majority of private sector members into the Board of Ghana Green Label (MoFA approval)
- The endorsement of the Ghana Green Label strategic plan (by the Ghana Green Label Board)
- The development of a pesticide residue monitoring plan for the Accra-Tema metropolis (by FDA)

In addition, a strategic plan was developed for PPRSD to transform it into a more autonomous Authority with clearer tasks and responsibilities. However, at the point of writing this strategy was not yet approved by the Minister.

7.2 Vegetable Export Taskforce

The Vegetable Export Taskforce was established as a result of a discussion between GhanaVeg and top officials of the Ministry of Food and Agriculture. GhanaVeg led the process by involving and committing other stakeholders, like GIZ, CABI, TRAQUE and USAID. The Taskforce came in existence after the EU organized an audit in 2015, following a previous audit in 2012. The mission basically found that none of the recommendations of the 2012 mission had been implemented (while interceptions were sky rocketing). As a result the Minister of Food and Agriculture established the Taskforce with the following mandate:

- Work with the Plant Protection and Regulatory Services Directorate (PPRSD) to provide an official response to the queries of the EU Audit of 2015;
- Ensure effective monitoring of the implementation of the remedial actions and recommendations planned; and
- Make appropriate recommendations to promote compliance with EU regulations.

Soon after the work of the Taskforce commenced in 2016, the EU followed with a ban on selected vegetables from Ghana. The Taskforce was then tasked to steer the country out of the ban with GhanaVeg being the secretary of the Taskforce. During the two year period, GhanaVeg led in developing a work plan to address each and every issue that was submitted by the EU (these were more than 20). GhanaVeg coordinated the donor support; getting interested donors to commit to specific tasks. As a result, GIZ committed to finalizing the Pest List and small equipment for the inspection unit; CABI led in establishing a pest surveillance system; GhanaVeg and USAID funded four embedded staff to supervise and coach NPPO staff at the point of exit; and all stakeholders contributed to the development of a Standard Operating Procedures (SOP) Manual. In addition, the Taskforce motivated Aviance (a cargo handler), to construct a modern inspection room at the airport to facilitate smooth phytosanitary inspections. Importantly, GhanaVeg (together with UoG) developed the 'Roadmap for Reduced Incidence of Harmful Organisms in Export Crops' as well as setting up

demonstration trials in the hotspots of the harmful organisms showcasing best management practices. The field activities took place over two seasons of the crop cycles of the three main harmful organism to the EU (false coddling moth, thrips and white flies), and the crops used were eggplants, chillies and gourds. The end result was a clear protocol for ensuring significantly reduced pest populations. The protocol was accepted by the EU Audit team in September 2017. The ban finally was lifted at the end of 2017 and exports to the EU commenced again in January 2018.

7.3 GGL Committee

From the programme's start GhanaVeg has been a strong supporter of the local Ghana Green Label scheme. However, major flaws in the scheme were observed and GhanaVeg supported the organization of the scheme, led by MoFA and GIZ, to include much more private sector partners. Also, GhanaVeg facilitated the process of the development of a strategic plan. Major policy changes were adopted as a result of this, the strategic plan was approved and the new Board now includes a majority of private sector representatives. The strategy of GGL now takes the private sector (and especially the F&V wholesalers and retailers) as their point of departure; ensuring they start marketing their produce under the GGL label, and source from GGL certified farmers. We expect that in the course of 2018 the scheme will become a household name in a number of major (high-end) market outlets (like Farmer's Market and a number of supermarkets). GGL stands for quality and safe vegetables produced by judicious application of pesticides, while taking into account high environmental sustainability standards.

7.4 Strategic Plan of PPRSD

The Plant Protection and Regulatory Services Directorate (PPRSD) of the Ministry of Food and Agriculture (MoFA) is the recognized National Plant Protection Organization (NPPO) and the official International Plant Protection Convention (IPPC) contact for Ghana. Its mandate is to organize, regulate, implement and coordinate plant protection services needed to support sustainable agriculture in Ghana.

PPRSD's major challenges with executing their duties became evident in 2009 when operational activities began to diminish as a result of a lack of funding. Being a directorate under the Ministry of Food and Agriculture, with strict employment conditions through the civil service system, didn't allow for much flexibility in staffing and income generation. As such other organizational models like the authorities of FDA and GSA proved more effective, as the authorities have greater independence and autonomy to recruit staff and generate income.

GhanaVeg therefore, after careful consultation with stakeholders, and following a request from the Minister of Food and Agriculture, commissioned a team of specialists to develop a strategic plan to guide the transformation of the PPRSD into a Plant Health Authority. An extensive Strategic Plan was developed by the consultants, however upon its completion the leadership of PPRSD had changed and the Minister has so far not prioritised such a far-reaching reform. Discussions are still ongoing with the Minister and his senior staff on whether or not (and how) to implement parts of the strategic plan.

7.5 Stories from the field

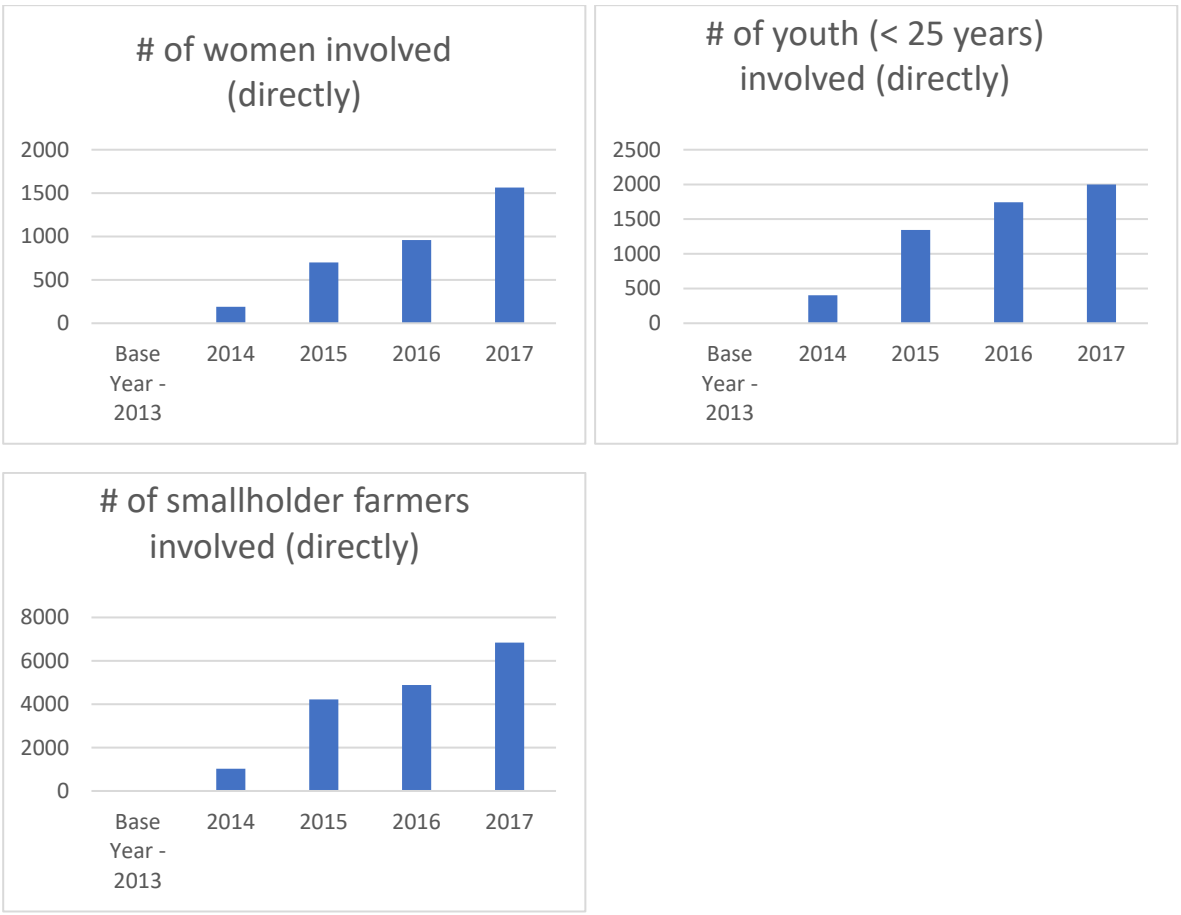
Mr. Kwesi Korboe – The Technical Advisor to the Minister of Food and Agriculture

"On the whole, GhanaVeg played a critical and timely role in support of Ghana's vegetable sector, both financially and technically. Especially the efforts to improve the collaborating between private and public actors are laudable, as there is still a big gap between their understanding of each other. GhanaVeg has been instrumental in the Vegetable Taskforce, a committee set up to oversee Ghana's compliance with EU directives. Through GhanaVeg's support and collaboration with other donor agencies and the University of Ghana, we have been able to lift the EU ban on selected vegetables. Hopefully the structures and systems are now in place to prevent another ban from happening. I think the outstanding quality of GhanaVeg has been that it tried to solve things hands-on and pragmatically; also taking the lead in a number of practical measures like organizing demonstration sites and field visits, needed to convince exporters to work in a different way. I also appreciated the trade missions from the Netherlands to Ghana, bringing in new ideas and potential investors. Lastly, I remember a number of publications that are now widely used by Ghanaian business people who are exploring to invest in the vegetable sector. I especially recall the business opportunities report and the one on greenhouses. All in all it was a pleasure working together with the GhanaVeg staff."

8 Inclusive economic growth

8.1 Introduction

One of the other requirements for GhanaVeg was the need to involve youth, women and small-scale farmers in the programme's implementation. This in order to ensure inclusive and balanced economic growth. For all the three groups the achievement exceeded the target. The total number of women directly involved in our activities was 1.564, while the target was 500 (see Figure 19), the total number of youth under 25 was 1.999, while the target was modestly set at 100 (see Figure 20), and the participation of smallholder farmers was 6.843, exceeding the target of 5.000 (see Figure 21). The difference between direct and indirectly involved farmers is in the intensity of their engagement in GhanaVeg activities. The directly involved farmers have been part of a project (e.g. as an outgrower) or a series of training activities; the indirectly involved farmers e.g. attended a field day, demonstration or trade fair event.



Figures 19-21 *Direct involvement of smallholder farmers, youth and women in GhanaVeg activities*

In the paragraphs below a number of examples of successful projects that particularly performed well in terms of inclusive growth have been highlighted. These have all been co-financed through the Business Opportunities fund.

8.2 Business Opportunities Fund

Agri Impact Consult

Agri-Impact trained over 100 vegetable farmers in good agronomic practices. In addition, they trained five extension officers and twenty greenhouse production assistants on greenhouse production, packaging and business plan development. The project had a strong youth component, looking at how recent graduates could establish their own business. In total six of these young graduates were selected and were trained on business plan development. Out of these six business plans, three are currently being implemented, after being linked to a financial institution (for funding the start-up). Two of them have a small (240 m2) greenhouse that they operate while two others (who didn't implement their business plan) are providing consultancy support for SMEs to develop a business plan.
In addition to these activities, a practical greenhouse production guide was produced that is being used by the greenhouse farmers that were trained at Agri Impact.

Kukobila Nasia Farms: Increasing production and local demand of butternut squash

Kukobila Nasia farms, based in the Northern Region (close to Tamale) was at a crossroads, as production of butternut squash had reduced in yield and quality. The company was unable to expand its outgrower scheme and to finalize its packhouse to be ready for exports. Through the GhanaVeg project the company had the opportunity to finalize its packhouse and invest in irrigation for its outgrowers, while employing a fulltime agronomist to address pests and diseases. The agronomist also joined the GhanaVeg agronomy training of trainers and was able to improve his knowledge on pest and disease management and irrigation. The company further invested in solar panels to reduce the cost of pumping water to the farm and its outgrowers. At the end of the project seventeen outgrowers were contracted; and trained in the production of butternut squash. In addition, the company purchased a tractor to service the outgrowers and the nucleus farm. As a result of the project productivity increased from 10 t/ha to 15 t/ha, with some farmers achieving close to 20 t/ha; and the outgrowers together realized a joint turnover of US$ 17.900 per season. As export demand for its butternut was slowing down, it embarked on promoting the use of butternut squash in the surrounding local communities. It did so through demonstrating its inclusion in local dishes and developed a recipe book to this end. The company also developed a number of demonstration sites to allow for farmers' visits. Kukobila especially appreciated the business to business matchmakings as organised periodically to find new customers. Kukobila participated in the last two GhanaVeg trade Fairs and received the price for the best booth in 2016. The fairs gave the company access to new customers and is currently expanding its production. In addition, new export arrangements are underway which can further boost its production.

VoltaVeg: Supporting women groups in vegetable production

VoltaVeg has been one of the medium-sized exporters that has always been creative in experimenting with new products for the export market. At the time of the export ban it produced 140 tons of vegetables mainly including Bambara beans and Asian vegetables. Together with GhanaVeg it increased its outgrower numbers from 11 to 195 with about 160 of these outgrowers being women. As a result the company's production volumes increased from 140 tonnes to 500 tonnes in 2017. The company mainly exports to the UK. Importantly, the company came in touch with two new buyers through the GhanaVeg website and newsletter. These clients wanted to buy winter squash and horned melon; and Daniel Aladi the General Manager of VoltaVeg started the production. As such Mr. Aladi compliments GhanaVeg: "They have been one of the more realistic projects in the sector; not only working on production aspects but also on practical market linkage".

For the successful implementation of the project the company used simple technologies to test the water and soil quality; guiding irrigation and soil fertility management practices. The company also installed smallholder irrigation facilities on the outgrower fields so that year-round production is possible. The company is also in the process of GlobalGAP certification (both option 1 and 2) and farmers have been trained on the production of bambara beans, winter squash and horned melon. The company also engaged a fulltime agronomist that supports both the nucleus farm and the 195 outgrowers. In addition, the company has built a packhouse to professionally organize the cleaning, grading and packing of the export vegetables.

9 Communications

9.1 Website

The backbone of GhanaVeg's information provision was the website. On the website all publications, newsletters and Calls for Proposals were published, as well as pictures of major events like Business Platform Meetings, Trade Fairs and Round Table meetings. The website also hosted project partner information, news, and was linked to social media handles (Facebook and Twitter).

9.2 Newsletters

GhanaVeg shared periodic monthly newsletters on its activities and sector information to stakeholders. In three-and-half years, 34 newsletters were send to the growing network of GhanaVeg members, that at the end consisted of 1.124 unique people. The newsletters included reports from GhanaVeg projects and activities, new products in the markets, and vacancies of vegetable companies.

9.3 GhanaVeg Food Diaries

In order to further inform the general public on all aspects of vegetable production and consumption GhanaVeg designed a 13-series cook show, dubbed 'GhanaVeg Food Diaries'. The program was aired on TV3, one of Ghana's most preferred and viewed station. The programme was aired at primetime on Sunday evening at 6 pm. In terms of viewers it was placed at the first spot for the entire series, with an average share of 22% and 1.324.719 viewers in February 2017, and 17% and 1.023.647 in April 2017. Through the TV Show new farmers were attracted and SMEs interested in doing something in the vegetable sector (see the Story from the field of Raymond in Chapter 3).

9.4 Media Engagement

GhanaVeg engaged different media channels, TV, print and radio, for its events. For radio and TV, GhanaVeg did 50 and 32 appearances respectively for its major events like the cook show, trade fairs, launch of reports and trade missions. The Business & Financial Times and Daily Graphic recorded 20 GhanaVeg-related stories while articles on online website totalled 90 directly.

Table 3 *Media engagement*

	Radio	TV	Newspaper	Online
2014-2015	10	4	5	10
2016	18	10	8	40
2017	22	18	7	40

9.5 Social Media

GhanaVeg focused on the use of new media (Facebook, Twitter & Instagram) for various activities. Facebook recorded more than 2.000 followers and the response rate was 87% with a page like of 1.880. Twitter recorded about 858 posts, 410 followers and 146 following, and Instagram recorded 123 followers, 46 following and 61 posts. Especially for Facebook there was a lot of interaction for most of the posts. Most of the replies came from young people willing to venture into vegetable production and quite a high number of people expressed interest in GhanaVeg's agronomy trainings and the cook show.

9.6 Stories from the field

Chef Selassie Atadika

"In 2016, I had the pleasure of working with GhanaVeg on the cook show, GhanaVeg Food Diaries. I was excited about the show because it was very much in line with two of my professional aspirations as a cook: eating local and promoting vegetables"

"The show also motivated me to try new things, as I got a sense of all the products that GhanaVeg partners were producing; and these formed the basis for my recipes. Since the show is for average Ghanaian households, I wanted to make sure the recipes used ingredients that could be found in most local markets. Knowing that most households have 2 working adults, I made sure the recipes could be made within 30-45 minutes. I used ingredients that were familiar but prepared them in new ways or added some unfamiliar ingredients to familiar recipes."

"GhanaVeg Food Diaries was a great initiative. And as for all behavioural change activities, it will take time to see what the results will be. I will continue to be an ambassador for plant-based eating and hope to see the cook show continue with a new series. It is important for this initiative to join other initiatives that support and promote healthy eating lifestyles."

10 Complementarity and sustainability

10.1 Complementarity

GhanaVeg tried as much as possible to leverage on other initiatives and link companies to other funding sources available in the Netherlands and beyond. As such the programme targeted ten loan or grant disbursements to vegetable companies. At the end of the programme we contributed to six initiatives in the vegetable sector:

- IDH: Support to HPW for expanding its outgrower scheme for fruit producers. In general we discussed quite a number of initiatives with Kebby Colley of IDH, however, only this proposal got approved.
- CABI: FDOV proposal for pest and disease management. We advised them on replacing Sunshine Organics as a partner in the programme with Quarco Initiatives. We also collaborated in the work of the Taskforce.
- NWO-WOTRO ARF: We contributed to the proposal of WU-Greenhouse Horticulture, Urban Jungle and Agri Impact Consult. The proposal got awarded in 2017.
- GIZ-MOAP: We supported Srighan Farms with its proposal to receive funding from GIZ for their gherkins project.
- Eden Tree: Though Stanford and Resonance took the lead in linking Eden Tree to the private I&P Africa Entrepreneurs Fund in 2015, we supported Eden Tree at the same time with support for her outgrowers and business expansion strategy.
- Delphy/Green Farming: We supported Delphy with its application for the impact cluster facility of RVO. They also participated in two trade missions organized by GhanaVeg.

We didn't reach the target here, though we organized a number of sessions on financing, inviting Ghanaian banks (Prudential, Barclays, ADB), foreign investors and the EXIM bank to the Business Platform meetings. Matchmaking between banks and horticulture companies was facilitated. As far as known no company investments were funded as a result of these activities. The main reason for this being the relative small size of the companies in our network, often having a turnover of less than US$ 200.000, with an investment demand of less than US$ 50.000. These ticket sizes are too small for the banks. In addition, many companies didn't have a banking track-record, or had audited accounts.

10.2 Sustainability

In terms of the sustainability of GhanaVeg's activities we collaborated with GAVEX. It is our strong ambition to have GAVEX gradually taking over the GhanaVeg brand and a number of the activities (in particular the business platforms, round tables and trade fairs). The programme provided co-funding for them to establish a small office and secretariat and have a dedicated agronomist who could support their member companies. Unfortunately, there was little consensus within the GAVEX Board on how the project should be implemented and in the end only a few activities were implemented (and a large part of the fund was returned to GhanaVeg). Ideally, the GhanaVeg advocacy and sector promotion activities are taken over by a private sector association. In HortiFresh we will further work on this.

With respect to the policy work we initiated the establishment of the Export Taskforce. At the end of the Programme discussions have been held to transform the Export Taskforce into a Horticulture Council or Horticulture Board. These discussions will be continued in the HortiFresh programme. The idea is that the Horticulture Board brings together the key public, private and development partners involved in the horticulture sector; which will then develop a strategy and workplan on how to address a number of challenges that the sector faces. The Technical Advisor of the Minister is in favour of this transformation for the Taskforce.

The third part of GhanaVeg consisted of financing for the sector (for innovative projects and upscaling). This will be taken up in the new phase of HortiFresh in which financing is a key component. Still, a form of soft loans and grant support will be needed to support the sector's transformation (as the EU needed in between the 1950s and present). GIRSAL and the EXIM Bank will play a very important role in this. The role of HortiFresh will be to advise these organizations to make the right choices and have sufficient capacity to do the due diligence of the companies that are being supported.

Otherwise, the GhanaVeg projects already have raised the turnover of the partner companies by more than US$ 5 million in the 2014-2017 period, with clear breakthroughs for companies like Eden Tree (+US$2,5 million), AB Farms (+US$310.000), Joekopan (+US$180.000), Tikola/EWS (+US$110.000), Lubok (+US$60.000), and Linkougud (+US$42.000). It is expected that these companies will be able to consistently increase their production and revenues over the next years as well.

10.3 Consultancy Fund: GAVEX

The objectives of the grant was to support GAVEX in organizational strengthening for the association, and for its members to produce high value crops like okra, tinda, beans and curry leaves which were not on the banned list and as such to increase the value of vegetables exported from Ghana.
For the organizational strengthening, an executive secretary was employed to follow the day today functions of GAVEX and liaise with relevant agencies. Unfortunately GAVEX was not able to work more closely with other associations as planned, however since the installation of a new executive council in May 2018 GAVEX is developing its democratic attitudes and involved with massive work to revamp the association and the constitution.

With regards to production an agronomist was employed to oversee activities which included demonstration sites showing the best cultural practices to enable members and their outgrowers to learn the best ways of producing the vegetables for exports to international destination. A number of members have constructed pack houses, and followed the correct protocols as laid down by PPRSD for export. The strict local inspection of produce before shipment at the airport by PPRSD has forced the exporters to adhere to the instructions, in most cases huge improvements have been achieved.
GAVEX is also working together with GGL and investing in tracking and tracing.

11 Conclusions & Lessons learned

11.1 Conclusions

In the 2013-2017 period GhanaVeg focused on the development of a competitive and sustainable vegetable sector. The programme supported around 30 innovative projects that were implemented by lead companies and research institutions. In addition, the programme worked on a number of issues in the enabling environment, ranging from phytosanitary issues to food safety, and from environmental concerns to public awareness on health and nutrition. GhanaVeg organized 20 well attended Business Platform meetings; four Round Table meetings, five trade missions and three trade fairs, which strengthened sector partnerships and business to business trade deals.

Overall, GhanaVeg worked with close to 7.000 smallholder farmers directly. These farmers were either part of outgrower schemes organized by lead companies or were involved in series of intensive trainings on good agricultural practices. Out of these farmers 4.305 farmers were able to increase their yields by more than 50%, substantially increasing their income. The increased income was often used to improve their family's quality of life, spending it on school fees, books, clothing and health care (39%), household items (including food and utilities) scored high too (with 22%), whereas 26% re-invested the money in the farm to acquire land, labour or inputs and machinery. Another 8% used the money for savings.

In terms of market development GhanaVeg put a lot of effort in the export sector. The end-line survey estimates that farm gate prices for export crops are often higher (and more stable) than for domestic crops, hence benefitting income of small-scale farmers to a greater extent. The export sector was confronted by an EU import ban for chillies, eggplants and gourds that took effect on 1 October 2015 and lasted till 31 December 2017. During this period GhanaVeg supported a wide range of activities to both lift the ban and diversify alternative vegetable exports, while strengthening the capacity of key export companies to build proper quality systems that involve: tracking and tracing, packhouse management and farmer training. The combined efforts, together with the multitude of activities by government and development partners, led to the lifting of the ban, while alternative exports increased from US$ 618.000 to US$ 833.000. We expect that in 2018 vegetable exports will increase to more than US$ 2 million again. Alternative export crops supported by GhanaVeg included: okra, herbs, butternut squash, tinda and curry leaves.

The past four years saw the rise of a number of specialized wholesale and retail F&V companies. These companies have their own outlets (like Farmer's Market and FreshMark) or channel through the rapidly expanding supermarket channels (Eden Tree, Fruitmaster). In this high-end segment of the market we estimate that the overall turnover has more than doubled during the life of the programme, from less than US$ 5 million in 2014 to more than US$ 11 million in 2017, only including vegetables. Recent research, commissioned by GhanaVeg and implemented by IFPRI, shows that wholesale prices for chillies, carrots and onions are much higher in Ghana than in neighbouring countries like Burkina Faso and Ivory Coast. The main reason for this is believed to be the lower productivity in Ghana and 'trader-organized' restrictions, the latter referring to the system of market queens that decide the entry to the main open markets of Accra and Kumasi. Supporting alternative market outlets can provide new options for farmers, while at the same time these new market players more heavily invest in certification (under the Ghana Green Label scheme) and support to farmers (through their outgrower schemes). All in all GhanaVeg supported five projects that contributed to the growth of the high-value domestic sector, including support for wholesalers, retailers and processors that source directly from smallholder farmers – often with a form of certification.

GhanaVeg motto is 'healthy and quality vegetables from Ghana through new ways of doing business'. Through its agronomy trainings and support for certification more than 1.000 farmers now have a GAP-related certificate, either GlobalGAP or Ghana Green Label. Crops produced by these farmers

comply to high standards of food safety and farmers apply agrochemicals in a judicious way. The second part of the motto was achieved through the multitude of business partnerships that were established, facilitated through GhanaVeg events. We estimate that more than 200 business-to-business initiatives started as a result of GhanaVeg events, often including dedicated matchmaking or 'speed-dating' activities.

At the end of 2017 the GhanaVeg network consisted of more than 1.100 business owners, researchers and government staff, all involved in vegetable sector activities. As such, the sum of the GhanaVeg results are greater than its parts. Examples of this are SMEs that started new activities based on GhanaVeg presentations and publications; some ventured into intensive vegetable farming by themselves or developed new consumer products for the high-end domestic market – without any direct support from GhanaVeg. Illustrations are provided in the main body of the report. Also in the encounters with companies they express their appreciation for this approach, feeling part of a sort of movement, being involved in GhanaVeg activities like the business platforms, trade fairs and newsletter communication.

GhanaVeg aimed to operate as a sector programme, working in an integrative manner on issues in the enabling environment, input supply, processing and marketing, as well as the world of finance. The main approach (and assumption) being that only through concerted effort by a multitude of stakeholders (including government and research) can Ghana move from a rather fragmented business landscape with low yields and low quality, to a sector in which business partnerships and dedicated chains thrive – decreasing chain inefficiencies and increasing income for the actors involved (and especially farmers). The outcomes in terms of growth of the export and domestic market are promising and provide prove that this approach works; though much still needs to done to truly become a sustainable and internationally competitive vegetable sector.

11.2 Lessons learned

Lessons learned include our work with the government, the specific characteristics of Ghanaian SMEs, the programme's structure and instruments, and the interests of the Dutch private sector.

The 2014-2017 laid bare that for increasing the competitiveness of the vegetable sector, the government and the public research institutes are key players to collaborate with. This has been evidenced by the work on lifting the export ban, and developing the Ghana Green Label chains (which is still work in progress). Especially the Export Taskforce, in which GhanaVeg served as the secretary, provides a good example on how government, private sector, research and development partners can work together. At the same time, the implementation capacity of the government (both in terms of human and physical resources) remains weak. Still much external support is being provided by development partners for PPRSD, and it remains to be seen how the phytosanitary service will perform once this support is phased out. Systemic or structural changes to transform the PPRSD into a more autonomous and responsive authority, so far have been rejected by the senior leadership. Something similar applies to the FDA that has difficulties in monitoring food safety of the vegetables available in Ghana's markets. As these two areas of phytosanitary issues and food safety clearly belong in the public domain, high level commitment and (financial) support are required to move beyond the – often comfortable - status quo. For addressing this, the collaboration with the Netherlands Embassy and the organized private sector has been crucial. We strongly feel, that through the Embassy initiated discussions with various Ministers and DGs the vegetable sector has become a priority sector for the government, and major flaws in the system could be addressed (e.g. through the Export Taskforce).

Working with the private sector also had its challenges. A large number of companies involved in Ghana's vegetable sector are either micro or small enterprises, often having an annual turnover of less than US$ 50.000. These companies often don't have the systems and management capacity in place to run a sizable business innovation project. Even though we provided much backstopping support, both technical and managerial, a number of projects didn't come to full fruition (though tangible results were achieved). For the second phase the focus will be more on the larger companies, typically with a turnover of more than US$ 150.000. Our experience working with these companies (often the

larger exporters, wholesalers or input suppliers) has been rather good in the first phase. Also, in terms of reporting and financial management these companies were easiest to work with. These companies also have the potential to make it to the next level, in which sound management, planning and technical expertise become crucial.

At the farm level the two main observations are that: i) many small-scale farmers are trapped in a low-input / low-output system due to the financial risks involved (volatility of market prices) and limited knowledge on the available inputs and good farming practices; ii) medium-sized commercial farmers have difficulties securing land, accessing credit and knowledge of more advanced horticulture systems (e.g. greenhouses, irrigation systems, nurseries, and input packages). The latter often want to go for high input / high output systems, but get stuck in buying suboptimal equipment or applying wrong farming practices. Solutions can be found in developing evidence-based input packages, working on demonstration plots (both with companies) and organizing better agronomic advisory services and networks. Also, in HortiFresh we will intensify our efforts in these two areas: quality input supply and agronomic services.

Lessons learned working with Dutch companies are that especially the Dutch seed companies are interested in Ghana's vegetable sector. Dutch seed companies that started or expanded operations in Ghana as a result of GhanaVeg support are: Bejo Seeds (Warmenhuizen), East West (Bangkok/Amsterdam), Enza (Enkhuizen), RijkZwaan (de Lier) and Syngenta (Enkhuizen). Also, promising inroads have been established with Dutch buyers for the export of organic herbs and chilli paste. In addition, the interest of greenhouse companies is warming up and through the consortium of Green Farming a demonstration farm will be established in Ghana. The above shows that the greatest interest of Dutch companies for Ghana's vegetable sector lies in trading (buying and selling) of inputs and produce, not in investing in primary production or processing.

A number of lessons learned have been summarized as recommendations for the next phase of GhanaVeg, called HortiFresh (2018-2021). The most important ones are:

- Continue to put pressure on the public system to deliver on key public responsibilities in the domain of phytosanitary services, food safety and environmental sustainability through public-private partnerships – either in horticultural hotspots or at national policy level.
- Work together with a number of larger companies that have a proven track record with an annual turnover of more than US$ 150.000, and are at the tipping point of becoming reliable, quality conscious wholesalers, exporters and input suppliers, willing to invest in smallholder farming. Projects will be bigger and for a longer period of time, with more intensive backstopping and coaching.
- Intensify efforts to develop comprehensive training modules for groups of farmers, to move from a low input – low output to a high input – high output system in a sustainable way. Strong linkages with input suppliers and off-takers are key in this matter.
- Start dedicated projects with those Dutch companies that are willing to go the extra mile in combining trading (buying or selling products) with agronomic services and after sales support. Again the track record from the first phase of GhanaVeg will serve as a selection criterion for future engagements.

Appendix 1 GhanaVeg Publications

Business Case for Vegetable Distribution Company
http://ghanaveg.org/wp-content/uploads/GhanaVeg_BusinessCase1.pdf-Vegetable-Distribution-Company-with-Cooled-Warehouse.pdf?x42440

Business Case for Greenhouses
http://ghanaveg.org/wp-content/uploads/GhanaVeg_Business-Case-2_Greenhouses.pdf?x42440

Roadmap to Pest Reduction
http://ghanaveg.org/wp-content/uploads/Final_GhanaVegSR6_PestRoadmap-1.pdf?x42440

Vegetable Opportunities in Ghana
http://ghanaveg.org/wp-content/uploads/BO-2016-2.pdf?x42440

GhanaVeg Export Report
http://ghanaveg.org/wp-content/uploads/GhanaVeg-Export-Report.pdf?x42440

Analysis of the Sanitary and Phytosanitary Status of the Vegetable Sector
http://ghanaveg.org/wp-content/uploads/SPS-Study.pdf?x42440

Strategies to support Greenhouse Horticulture
http://ghanaveg.org/wp-content/uploads/Strategies-to-Support-Greenhouse-horticulture.pdf?x42440

Production Guides
African Eggplant
http://ghanaveg.org/wp-content/uploads/GhanaVeg_AfricanEggplant_2017-Crop-Guide.pdf?x42440

Bushy Tomatoes
http://ghanaveg.org/wp-content/uploads/GhanaVeg_BushyTomato_2017-Crop-Guide.pdf?x42440

Cabbage
http://ghanaveg.org/wp-content/uploads/GhanaVeg_Cabbage_2017-Crop-Guide.pdf?x42440

Okra
http://ghanaveg.org/wp-content/uploads/GhanaVeg_Okra_2017-Crop-Guide.pdf?x42440

Sweet Pepper
http://ghanaveg.org/wp-content/uploads/GhanaVeg_SweetPepper_2017-Crop-Guide.pdf?x42440

Onion
http://ghanaveg.org/wp-content/uploads/GhanaVeg_Onion_2017-Crop-Guide.pdf?x42440

Eggplant
http://ghanaveg.org/wp-content/uploads/GhanaVeg_Eggplant_2017-Crop-Guide.pdf?x42440

Carrot
http://ghanaveg.org/wp-content/uploads/GhanaVeg_Carrot_2017-Crop-Guide.pdf?x42440

Cucumber
http://ghanaveg.org/wp-content/uploads/GhanaVeg_Cucumber_2017-Crop-Guide.pdf?x42440

Watermelon
http://ghanaveg.org/wp-content/uploads/GhanaVeg_Watermelon_2017-Crop-Guide.pdf?x42440

Progress Reports
Eden Tree
http://ghanaveg.org/wp-content/uploads/Progress-Update-EdenTree.pdf?x42440

Joekopan
http://ghanaveg.org/wp-content/uploads/Progres-Update-Report-Joekopan-Ent.pdf?x42440

AB Farms
http://ghanaveg.org/wpcontent/uploads/ABFarms_GhanaVeg_PUR4.pdf?x42440

Touton Ghana Limited
http://ghanaveg.org/wp-content/uploads/Touton-GVegPUR7-revised.pdf?x42440

Wienco Ghana Limited
http://ghanaveg.org/wpcontent/uploads/Wienco_GhanaVeg_PUR5.pdf?x42440

Kukobila
http://ghanaveg.org/wpcontent/uploads/Kukobila_GhanaVeg_PUR6.pdf?x42440

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The Wageningen Centre for Development Innovation works on processes of innovation and change in the areas of food and nutrition security, adaptive agriculture, sustainable markets, ecosystem governance, and conflict, disaster and reconstruction. It is an interdisciplinary and internationally focused unit of Wageningen University & Research within the Social Sciences Group. Our work fosters collaboration between citizens, governments, businesses, NGOs, and the scientific community. Our worldwide network of partners and clients links with us to help facilitate innovation, create capacities for change and broker knowledge.

The mission of Wageningen University & Research is "To explore the potential of nature to improve the quality of life". Under the banner Wageningen University & Research, Wageningen University and the specialised research institutes of the Wageningen Research Foundation have joined forces in contributing to finding solutions to important questions in the domain of healthy food and living environment. With its roughly 30 branches, 5,000 employees and 10,000 students, Wageningen University & Research is one of the leading organisations in its domain. The unique Wageningen approach lies in its integrated approach to issues and the collaboration between different disciplines.

To explore the potential of nature to improve the quality of life

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