

**Good Agricultural Practices (GAP)  
in Sri Lanka:  
*Status, Challenges and Policy  
Interventions***

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## **FOREWORD**

Immense importance is attached in assuring food quality and safety of the nation. According to Food and Agriculture Organization of United Nations(FAO), Good Agricultural Practices(GAP) are set of principles, regulations and technical recommendations applicable to production, processing and food transport, ensuring safety and quality of produce in the supply chain, capturing new market advantages by modifying supply chain governance, improving natural resources use, worker health and working conditions and creating new market opportunities for farmers and exporters in developing countries. The government emphasizes that “SL GAP” initiated by Department of Agriculture is one of the best solutions for safe and quality food.

In this background, Hector Kobbekaduwa Agrarian Research and Training Institute conducted a study on Good Agricultural Practices (GAP) in Sri Lanka; Status, Challenges and Policy Interventions in 2018 July. This report presents detail description of present status of small scale GAP farms in selected districts and attempted to find out the factors that enable and hinder successful implementation of GAP Programme in Sri Lanka for local and export market in fruit and vegetable sectors and to provide policy directives regarding sustainability of SL GAP programme. Finally, it identified that GAP is a timely and worthy programme with regard to food quality and safety even though farmers face several issues.

I appreciate researchers’ attempt of successfully completing the study and I hope the findings and recommendations would be helpful in making policy decisions of further progression of GAP Programme in Sri Lanka.

**Duminda Priyadarshana**  
**Director/CEO (Actg)**

## **ACKNOWLEDGEMENTS**

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## EXECUTIVE SUMMARY

Standards and technical regulations constitute an increasingly prominent aspect of the international trade policy debate. Further, consumers are ever more concerned about obtaining safe food and producing them while paying attention to the environment and worker wellbeing. “Good Agricultural Practices” have emerged in this context and can simply be defined as doing things well and guaranteeing it has been done. Since, there is an immense importance of assuring food quality and safety of the nation and government emphasizes that SL GAP is the best solution for safety food which has been established in 2016 by Division of Agribusiness Counseling (DoAgbiz) of Extension and Training Center of Department of Agriculture with the aim of “Establishment of a mechanism to ensure quality and safety of agricultural commodities to local and export markets through GAP”. Presently, it is continued with the support of Provincial Departments of Agriculture. This programme is aimed at instructing, inspecting, and monitoring the whole value chain from the field up to the retail markets of local markets and up to exit point when it comes to export market to assure the quality of products. It has been observed that there was slow progression of GAP programme and it is vital to understand what factors hinders GAP programme, why this programme should be carried out. Hence the objective of the study was to find out factors that allow and hinder successful implementation of GAP programme in Sri Lanka for local and export market in the fruit and vegetable sector. This study was conducted in six districts including 85 farmers.

According to the study, GAP is a timely and worthy programme with regard to food quality and safety. However, farmers’ perception regarding the level of achieving expectations was dissatisfying. Farmers encounter several issues while exporting of GAP crops for special markets such as the European Union and the main constraint for exporting of GAP products was difficulty in finding buyers. Unavailability of continuous demand, absence of expected price and increase of COP were other reasons. Less recognition for the GAP certificate is the main constraint for successful continuation of the programme. Perception towards the level of publicity by farmers towards GAP programme was unsatisfactory as there was no demand for GAP products from the general public. Further, unavailability of special outlets to sell GAP products was another problem in the local market.

Hence, GAP certification needs to be given more recognition, through consumer awareness programmes and advertising campaigns. This would enhance demand for products locally and a better price for GAP products. Frequent farmer awareness programmes by way of Farmer Business Schools and field demonstrations need to be implemented. This would add business elements to GAP farming enhancing adoption of good practices and linking to markets assistance, in terms of information on potential export markets, linking to export markets, encouraging forward market contracts. This should be linked to the Government strategy to increase the export potential of the

country. Similarly, producer friendly GAP certification needs to be strengthened. Private sector needs to be encouraged to assist GAP farmers, with material support, specially at the initial stage so that more GAP farmers can be contracted to supply export quality goods. First time GAP farmers should be provided with relevant farming equipment at the initial stage at concessionary rate. Introducing a crop insurance scheme for GAP farmers would minimize the risk of crop loss due to pests and diseases damages. Establishing special outlets for GAP should be carried out widely in urban cities where people willing to pay higher price for quality and safety products. Collecting centers and cool rooms should be established at least in major producing areas particularly for GAP products. Selling GAP products through a mobile vehicle and use of GAP products for hospitals can be recommended. Reasonable price for GAP certified products should be assured by the government and the supermarkets to encourage GAP farmers.

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## ABBREVIATIONS

AI	Agricultural Instructor
ASCs	Agrarian Services Divisions
ASEAN GAP	Association of Southeast Asian Nations GAP
COP	Cost of Production
CAB	Counsellor of Agribusiness
DOA	Department of Agriculture
DoAgbiz	Division of Agribusiness Council
DSDs	Divisional Secretariat Divisions
ETL	Economic Threshold Level
EUREPGAP	European System Related to Good Agricultural Practices
EU	European Union
FAO	Food and Agriculture Organization
GAP	Good Agricultural Practices
GMO	Genetically Modified Organisms
GMP	Good Manufacturing Practices
IT	Information Technology
IPM	Integrated Pest Management
IQR	Inter Quartile Range
MRL	Minimum Residue Values
MOAC	Ministry of Agriculture and Cooperatives
NPQS	National Plant Quarantine Service
QR	Quick Response
SLSI	Sri Lanka Standard Institute
TA	Technical Assistant

## **CHAPTER ONE**

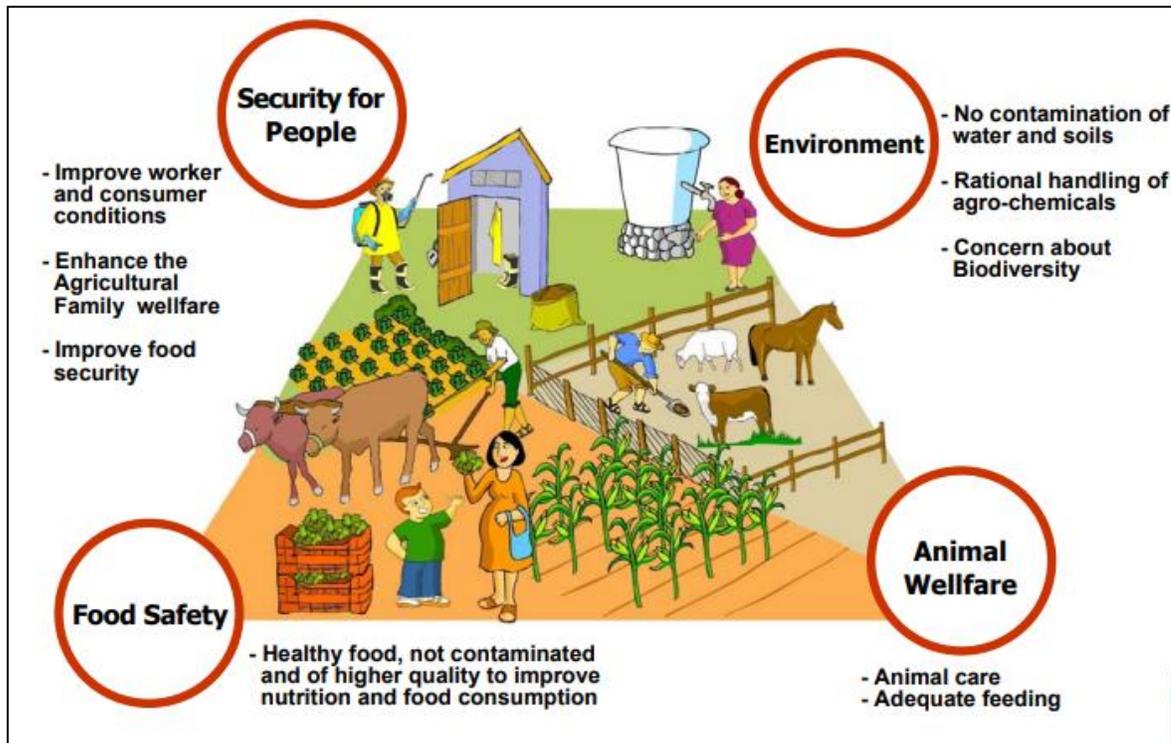
### **Introduction**

#### **1.1 Background**

Standards and technical requirements are increasingly prominent parts of the international trade policy debate. In particular, there is a wide range of different standards and requirements in the food sector such as hygienic standards, sanitary and phyto-sanitary standards, or maximum levels related to the content of Aflatoxin or pesticides. A more comprehensive approach to standards is, certification consisting of a number of different standards and regulations concerning food quality, environmental or social issues. Certification generally aims at providing consumers with better information about the characteristics and quality of food products, thus enhancing market transparency (Baghasa, 2008).

##### **1.1.1 What are Good Agricultural Practices (GAP)?**

Consumer interest in safe food while protecting the environment and ensuring worker wellbeing has been growing in the recent times. Good Agricultural Practices (GAP) come to the fore in this backdrop and it can be simply defined as doing things well and guaranteeing it has been done. Hence GAPs and Good Manufacturing Practices (“GMP”) are a set of principles, regulations and technical recommendations applicable to production, processing and food transport, ensuring safety and quality of produce in the supply chain, capturing new market advantages by modifying supply chain governance, improving natural resources use, worker health and working conditions and creating new market opportunities for farmers and exporters in developing countries (FAO, 2007). The four 'pillars' of GAP are economic viability, environmental sustainability, social acceptability and food safety and quality. It is expected that farmers and their families will obtain healthy and good quality food to assure their nutrition and nourishment, generating a value addition in their products to access markets in a better way. Further, consumers will enjoy better and safe quality food with sustainable production and the population will benefit from a better environment (FAO, 2007). Figure 1.1 depicts facets of GAP and according to that security for people, environment, food safety and animal welfare is ensured.



Source: FAO, 2007

**Figure 1.1: Pillars Fostered by GAP**

### 1.1.2 Practice of GAP in World Context

GAP is a widely accepted phenomenon that there are several well accepted GAP standards such as GLOBAL G.A.P, Association of Southeast Asian Nations GAP (ASEAN GAP), ThaiGAP etc. Moreover Australia, Chile, Taiwan, Indonesia, Philippines, Malaysia, Sri Lanka and many other counties are practicing GAP at present.

#### GLOBAL G.A.P

European System Related to Good Agricultural Practices (EUREPGAP) for fruits and vegetables commenced as a private sector standard developed in 1997 by European supermarket chains and their major suppliers, representing all stages of the supply chain in the fruit and vegetable sector in Europe (FAO, 2016). The EUREPGAP standards helped producers comply with Europe-wide accepted criteria for food safety, sustainable production methods, worker and animal welfare, and responsible use of water, compound feed and plant propagation materials. Harmonized certification also meant savings for producers, as they would no longer need to undergo several audits against different criteria every year. Over the next ten years the process spread throughout the continent and beyond. Driven by the impacts of globalization, a growing number of producers and retailers around the globe joined in, gaining the European organization

global significance (GLOBALG.A.P, 2016). The name of EUREPGAP was changed to GLOBALG.A.P. in September 2007 to reflect its increasingly global scope. GLOBALG.A.P. is a private sector body that sets voluntary certification standards and procedures for Good Agricultural Practices. It aims to increase consumer confidence in food safety by developing good agricultural practices to be adopted by producers. The focus of GLOBALG.A.P. is on food safety and traceability, although it also includes some requirements on worker safety, health and welfare, and conservation of the environment. GLOBALG.A.P. is a pre-farm gate standard, which means that the certificate covers the process of the certified product from sowing of the seed until it leaves the farm. GLOBALG.A.P. has so far developed GAP standards for fruits and vegetables, and other products such as combinable crops, flowers and ornamental plants, green coffee, tea, pigs, poultry, cattle and sheep, dairy and aquaculture (salmon). Other products are likely to be included later. Currently there are more than 150,000 farms in over 123 countries implementing the GLOBALG.A.P standard and more than 140 approved certification bodies around the world are managing these certifications (FAO. 2016). GLOBALG.A.P. today is the world's leading farm assurance programme, translating consumer requirements into Good Agricultural Practices in a rapidly growing list of countries – currently more than 120 (GLOBALG.A.P, 2016).

## **ASEAN GAP**

ASEAN GAP is a standard for Good Agricultural Practice during production, harvesting and postharvest handling of fresh fruit and vegetables in the ASEAN region developed by the ASEAN Secretariat and launched in 2006. This is implemented to enhance harmonization of product standards and facilitate trade. ASEANGAP certified producers have great opportunities to enhance their exports of fresh fruits and vegetables to other ASEAN countries. The main constraint of ASEANGAP is that it only covers fresh fruits and vegetables. It does not cover products that present a high risk to food safety such as fresh cuts and sprouts. It is still a very new standard in a regional and international context. ASEANGAP is not a standard for certification of organic products or Genetically Modified Organisms (GMO)-free products.

ASEANGAP consists of four modules covering

- Food safety
- Environmental management
- Worker health, safety and welfare
- Produce quality

Each module can be used alone or in combination with other modules. This enables progressive implementation of ASEANGAP, module by module, and based on individual country priorities. Certification is carried out by national authorities in each of the ASEAN countries. Since ASEANGAP is intended to enhance harmonization of product standards

and facilitate trade there are great opportunities for certified producers to enhance their exports of fresh fruits and vegetables to other ASEAN countries. For the less developed ASEAN countries there is an opportunity to use ASEANGAP as a benchmark in developing national GAPs, as the ASEANGAP includes implementation guidelines and training materials as well as a code of recommended practices. Member countries can benchmark their country GAP programmes against ASEANGAP to achieve harmonization. The main constraint of ASEANGAP is that it only covers fresh fruits and vegetables. It does not cover products that present a high risk to food safety such as fresh cuts. It is still a very new standard in a regional and international context. ASEANGAP is not a standard for certification of organic products or GMO-free products (FAO,2007).

### **Thai GAP**

Food safety is an important issue in Thailand. The year 2004 was declared the year of food safety and that Thailand becomes “the kitchen of the world”. There was Road Map of Food safety which contained five strategies.

1. Agricultural inputs and raw materials
2. Production at farm level
3. Control of crop protection products
4. Quality crop production
5. Domestic and foreign market

Therefore, GAP programme is an important component in the road map of food safety. The development of national GAP scheme has been driven by government in particular by the Ministry of Agriculture and Cooperatives (MOAC) in Thailand. Farmers who fulfill the requirements of national GAP programme can label their products with GAP logo after certified by accredited Certification Body or Government Certification Body. In addition, a regional GAP programme as developed by the Western part of Thailand (known as Western GAP cluster) using GLOBALGAP Standards (Wannamolee,2008).

#### **1.1.3 GAP in Sri Lanka (SL GAP)**

The project of “Establishment of a mechanism to ensure quality and safety of Agricultural commodities to local and export markets through GAP is implemented through the Division of Agribusiness Council (DoAgbiz) in Sri Lanka. The project objective is to develop a locally appropriate GAP programme and Agriculture Produce Safety Information System in Sri Lanka. Initially it was conducted as a pilot project and duration was 2016-2018. Later it was handed over to the Provincial Departments of Agriculture with the collaboration of Department of Agriculture. Main duties and responsibilities of the officers attached to the DoAgbiz were instructing, inspecting and monitoring of the whole value chain from the field (soil and seed) up to the retail markets and up to the exit point which is the National Plant Quarantine Service (NPQS) gate, when it comes to European export market to assure the quality of products. Their duties also included preparation of weekly based

cropping calendar to maintain a backup volume to ensure consistent supply. GAP is being introduced on crop basis for fruits and vegetables. Producers are registered and certified at DoAgbiz as quality assured suppliers while DoAgbiz act as a data hub to provide necessary information to the parties concerned. Agribusiness Counsellors in the field were provided with the latest Information Technology (IT) facilities for fast dissemination of information and issuing of Quick Response (QR) certificate for traceability (Department of Agriculture, 2016).

Project Activities were as Follows

- Development of GAP manuals (crop basis for fruits and vegetables)
- Training officers and farmers
- Soil testing
- Establishment of GAP in the fields and verification farm activities
- Strengthen information network among stakeholders of the value chain of fruits and vegetables

DoAgbiz has given technical assistance to develop Sri Lanka Good Agricultural Practices (SL-GAP) standard. This was developed in collaboration with Sri Lanka Standard Institute(SLSI), DOA and other relevant public and private organizations and standards have been published as Sri Lanka Standard 1523 part 1:2016, UDC 631.57:634 (Department of Agriculture, 2016).

According to Lanka Fruit and Vegetable Producers, Processors and Exporters Association (LFVPPEA) over usage of chemicals and usage of banned chemicals in agricultural lands, poor packing methods and lack of post-harvest technologies were the current major issues that the industry should address that was detected by the European Union (EU). For instance, Sri Lankan pineapples which were exported to EU contained Ethephon for a long time. Hence, Sri Lanka has been warned by the EU regarding the quality of its exported fresh fruits and vegetables from November 2014 (Paranagamage, 2015). At that point initiation of the programme was emphasized. The Department of Agriculture targets that with the successful implementation of GAP, export of fruits and vegetables for European market would be promoted and also safety and quality of consignments would be assured.

## **1.2 Problem Justification and Significance of the Study**

There is an immense importance of assuring food quality and safety of the nation and government emphasize that SL GAP is the best solution for safety food which has been established in 2015. It has been observed that slow progression of GAP programme and it is vital to understand what factors hinder GAP programme. On the other hand, it is necessary to identify why this programme should be carried out and potential for that. Hence, GAP is a globally accepted phenomenon, it should be sustained while overcoming the barriers, catering to local and export markets, particularly without export rejections.

Hence, special attention should be drawn to and action should be taken in that regard. Identifying and implementation of policy interventions should be made to clear the avenues for smooth dissemination of GAP as an innovative farm practice. Since this practice is a novel experience in Sri Lanka no such research has been conducted so far.

### **1.3 Main Objective**

The main objective of this study is to find out the factors that enable and hinder successful implementation of GAP Programme in Sri Lanka for local and export market in fruit and vegetable sector and to provide policy directives regarding sustainability of SL GAP programme.

#### **1.3.1 Specific Objectives**

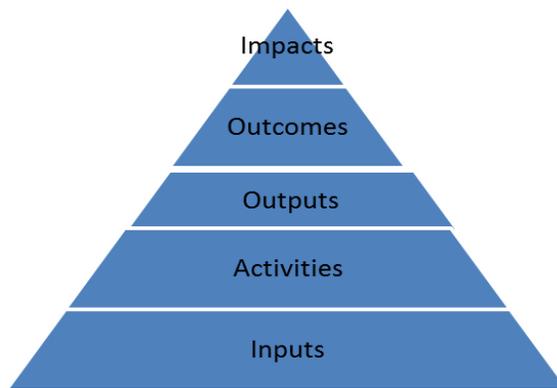
1. To identify socio economic background of GAP Farmers and selected districts
2. To identify present status of GAP Farmers in each district, perception and adoption status of SL GAP in selected districts
3. To identify challenges and prospects of SL GAP in selected districts
4. To suggest policy/strategy interventions for sustainability of the SL GAP programme

### **1.4 Conceptual Framework**

Conceptual Framework was based on results framework.

#### **1.4.1 Results Framework**

A results framework (Figure 1.2) is an explicit articulation (graphic display, matrix, or summary) of different levels, or chains, of results expected from a particular intervention—project, programme, or development strategy. The results specified typically comprise the longer-term objectives (often referred to as “outcomes” or “impact”) and the intermediate outcomes and outputs that proceed, and lead to, those desired longer-term objectives (World Bank, 2012).



**Figure 1.2: Components of Results Framework**

### **1.5 Methodology**

Parameters for the study were selected based on the results framework. Sample Units are SL GAP practicing farmers. There were 225 GAP Farmers in Sri Lanka during the data collection period. Six districts were selected purposively and 85 farmers were interviewed excluding companies. During the survey almost all the available farmers were included. Moreover, GAP officers and other relevant officials were other key informants. Primary data was collected by using pre tested structured questionnaire, key informant discussions and telephone conversations and secondary data was used from DOA and Department of Census and Statistics. A descriptive statistical analysis was carried out for making a comparison of general characteristics of sample farms and in other analyses wherever necessary. Likert Scale was used to measure perception of farmers regarding different aspects whereas Inter Quartile Range (IQR) were used to measure the variance and median should be used as the measure of central tendency for Likert scale data. Further, Paired T test was used to compare two population means in which observations in one sample can be paired with observations in the other sample and Principle Component Analysis was done to identify most influential outcome of SL GAP using eight variables (Table 1.1).

**Table 1.1: Variables Used to Measure Outcome of GAP**

<b>Variables used</b>
Increased income
Reduced COP
Increased yield
Increased cultivated extent
Increased production and sales
Increased used of advanced irrigation technology
Used information technology

KMO and Bartlett's Test was conducted to find whether Principal Component Analysis (if  $>0.500$ ). Principal Component Analysis can be applied and it was carried out by using Varimax with Kaiser Normalization Method to extract the factors and Friedman Test was used to compare the mean ranks between the factors extracted.

**Table 1.2: Sample Size of Each District<sup>1</sup>**

District	Sample Size
Hambantota	24
Rathnapura	14
Gampaha	17
Badulla	11
Matale	10
Kalutara	9

**Table 1.3: Parameters to be Used for Empirical Framework**

Level	Indicator	Measurement
<b>Goal(impact)</b>	Increased agricultural export (Fruits/Vegetables), earnings to the country	Value, % growth / year
<b>Outcomes</b>	Increased income	Ratings
	Reduced cost of production(COP)	Ratings
	Increased per acre yield	Ratings
	Increased extent cultivated	Ratings
	Change in farmers ability to market products for exports and local as GAP products	Ratings
<b>Output</b>	Adoption of new GAP practices or technologies	Ratings /rate
	Increased used of advanced irrigation technology	Ratings
	Used information technology	Ratings
<b>Activities</b>	Demonstration established /	Number
	Farmer awareness of extension activities	Number
	Intensity of extension coverage	Families
	Frequency of face-to-face meeting with farmer	Average number per month; average time spent
	Farmer evaluation of extension providers	Ratings
	Extension staff assigned in the field	Number of agents living in communities they serve
<b>Input</b>	Technical assistance provided: Expertise,	Person-weeks
	Goods (e.g., equipment and vehicles) procured	Number

<sup>1</sup> Total population of GAP Farmers taken excluding companies

## CHAPTER TWO

### Demographic Factors, Socio-economic Status of Farmers and Land Use Pattern

#### 2.1 Introduction

A sample survey was done in six selected districts based on availability of GAP Farmers. Accordingly, Gampaha, Kalutara, Rathnapura, Badulla, Hambantota and Matale were selected for the study. Several demographic factors were collected from secondary data of the above mentioned districts. The number of Divisional Secretariat Divisions (DSDs) and number of Agrarian Services Divisions (ASCs) are depicted in Table 2.1 of each district.

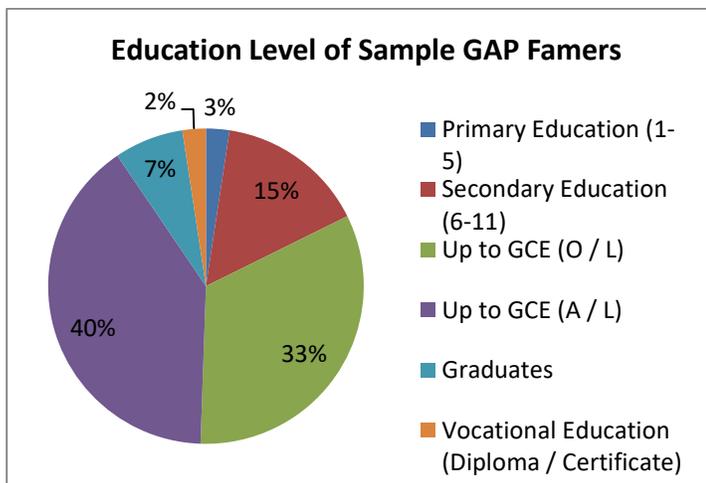
**Table 2.1: Number of Divisional Secretariat Divisions and Agrarian Services Divisions**

	Gampaha	Kalutara	Rathnapura	Badulla	Hambantota	Matale
No of DSD	13	14	17	15	12	11
No of ASC	26	20	30	30	18	23

Source: District Statistical Branch of each district (2018) - Department of Census and Statistics

#### 2.1.1 Education Level of GAP Farmers

According to Figure 2.1, nearly half of them had learned G.C.E. A/L or higher.

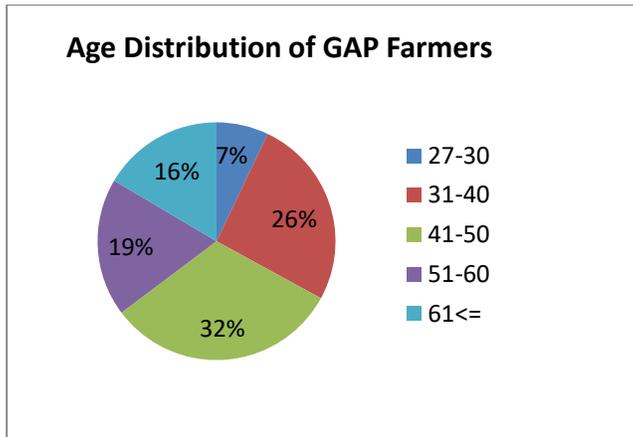


Source: HARTI Survey 2018

**Figure 2.1: Education Level of GAP Farmers**

### 2.1.2: Age Categories of GAP Farmers

Majority (65 percent) of farmers who practice GAP were below 50 years of age (Figure 2.2). Moreover, nearly 60 percent of them were between 30 to 50 years.

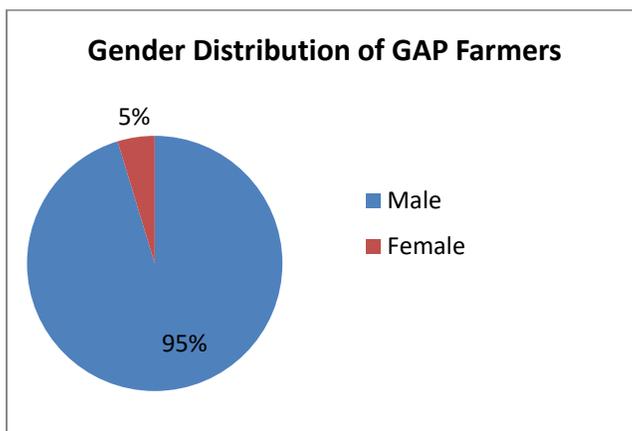


Source: HARTI Survey 2018

**Figure 2.2: Age Categories of GAP Farmers**

### 2.1.3 Gender Distribution of GAP Farmers

It was identified that 95 percent of people engaging in GAP farming are males, which implies the less tendency of females to engage in innovative activities taking risk (Figure 2.3).



Source: HARTI Survey 2018

**Figure 2.3: Gender Distribution of GAP Farmers**

### 2.1.4 Employment

According to Table 2.2, 54.5 percent of labour force (Age 15 years and above) in Badulla in 2017 engaged in agriculture, forestry and fishing. Moreover, 40.23, 36.2, 32.2 percent of the labour force of Rathnapura, Matale and Hambantota respectively engaged in agriculture, forestry and fishing whereas, only 3.2 percent of the labour force in Gampaha engaged in above mentioned.

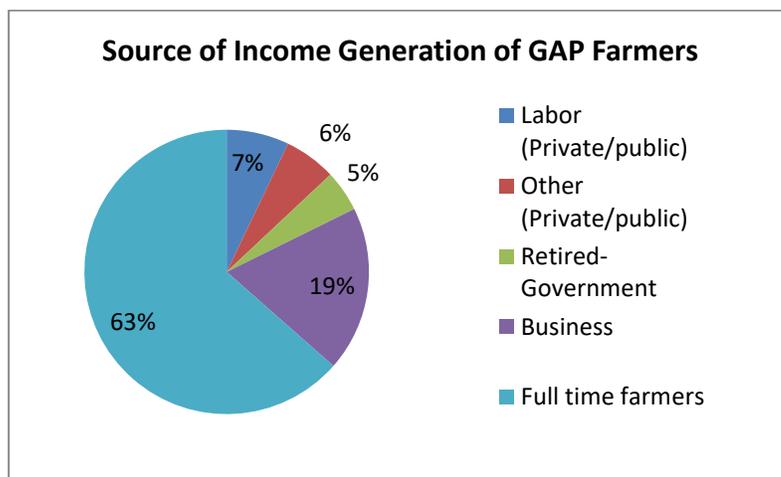
**Table 2.2: Percentage of Employment in Agriculture, Forestry and Fishing by Sector (Age 15 years and above) – 2017**

	Gampaha	Kalutara	Rathnapura	Badulla	Hambantota	Matale
Percentage	3.2	12.9	40.23	54.5	32.2	36.2

Source: Department of Census and Statistics (2018)

### Employment Status of GAP Farmers

According to the sample survey, 63 percent of the sample population were full time farmers and 19 percent were having business other than farming (Figure 2.4).

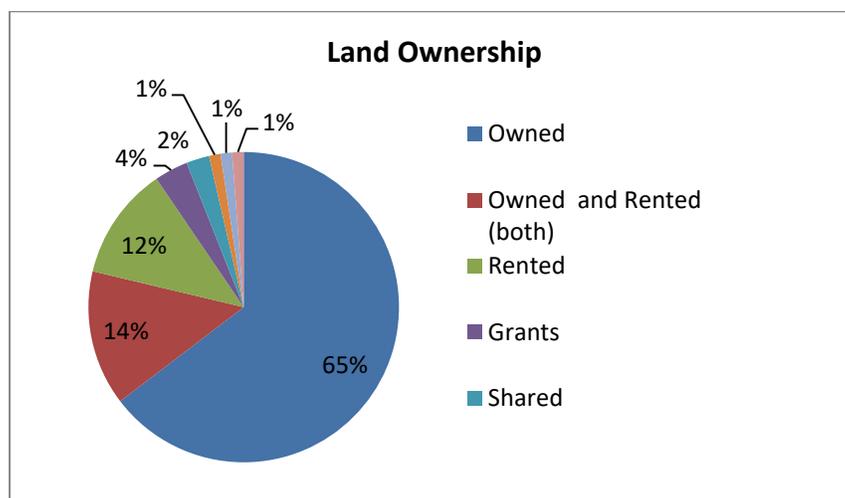


Source: HARTI Survey 2018

**Figure 2.4: Source of Income Generation of GAP Farmers**

### 2.1.5 Land Extent and Ownership

According to Figure 2.5, majority (65 percent) were land owners whereas 12 percent farmers have owned rented lands whereas 42.6 percent of sample GAP Farmers have less than one acre and only 21.3 percent have more than five acres (Table 2.3). Moreover, 96.7 percent those who own low land have less than 1.5 acres of low land.



Source: HARTI Survey 2018

**Figure 2.5: Type of Land Ownership of GAP Farmers**

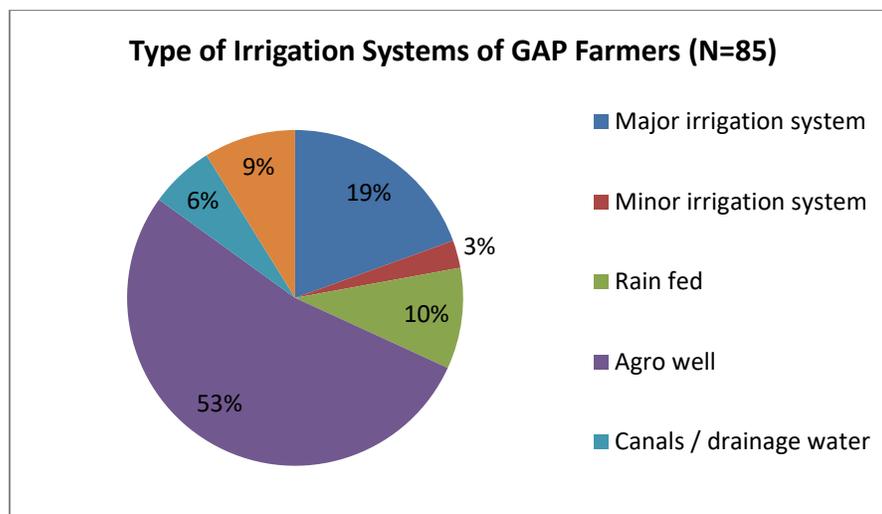
**Table 2.3: Extent of Lands Owned for Farmers**

Type of Land		Extent	No (%)
Highland	Owned(n=61)	<=0.5	18.0
		0.6-1	24.6
		1.1-5	36.1
		5.1-10	13.1
		10.1<=	8.2
	Other(n=18)	<=0.5	11.1
		0.6-1	27.8
		1.1-5	44.4
		5.1-10	16.7
Low land	owned(n=30)	<=1	36.7
		1.1-5	60.0
		5.1<=	3.3
	other(n=12)	<=1	33.3
		1.1-5	66.7

Source: HARTI Survey 2018

### 2.1.6 Type of Irrigation Systems of GAP Farmers

Figure 2.6 depicts type of irrigation of GAP Farmers.



Source: HARTI Survey 2018

**Figure 2.6: Type of Irrigation of GAP Farmers**

### 2.1.7 Ownership of Vehicles and Other Accessories

According to study findings, a significant percentage has their own vehicles including cars, vans, three wheelers, small lorries etc., whereas 20 percent had computers at their home (Table 2.4).

**Table 2.4 Percentage of Farmers Owning Vehicles and Other Machinery**

Item	% n=85
Computers	20.00
Cars / Vans / Other	30.59
Three-wheelers	32.94
Motorcycles	82.35
Small Lorries	22.35

Source: HARTI Survey 2018

### 2.1.8 Ownership of Agricultural Machinery

According to Table 2.5, nearly 70 percent of farmers had power sprayers whereas 120 percent owned water motors and it highlights that some had more than one motor. Furthermore, 32.94 percent of them owned two wheel tractors.

**Table 2.5: Percentage of Farmers who Own Vehicles and Other Machinery**

	<b>% n=85</b>
Two wheel tractors	32.94
Four wheel tractors	9.41
Water motor	120.00
Grass cutters	76.47
Power sprayer	69.41
Reapers	5.88
Ploughing machines	2.35

Source: HARTI Survey, 2018

## 2.2 Land Use Pattern

Table 2.6 highlights land used pattern in each district including total extent of cultivated lands, total extent of not cultivated lands, total extent of forest and total land area. Moreover, the number of different extent of agricultural lands is mentioned in Table 2.7 and composition of agricultural lands is included in Table 2.8.

**Table 2.6: Land Used Pattern in Each District**

	<b>Gampaha Hec'000</b>	<b>Kalutara Hec'000</b>	<b>Rathnapura Hec'000</b>	<b>Badulla Hec'000</b>	<b>Hambantota Hec'000</b>	<b>Matale Hec'000</b>
Total extent of cultivated lands	1,165.37 (84.04%)	893.2 (55.9%)	2051 (62.63%)	863.5 (30.18%)	1849.18 (70.88%)	1046.2 (52.5%)
Total extent of uncultivated lands	193.43 (13.95%)	548.8 (34.3%)	127 (3.88%)	1390.17 (48.59%)	274.31 (10.55%)	180.8 (9.1%)
Total extent of forest	27.89 (2.01%)	156 (9.8%)	1097 (33.5%)	607.3 (21.23%)	484.51 (18.57%)	766 (38.4%)
Total land area	1,338.9 (100%)	1598 (100%)	3275 (100%)	2861 (100%)	2609 (100%)	1993 (100%)

Source: Department of Census and Statistics, 2018

**Table 2.7: Extent of Farmer Lands in Each District (No. of Plots)**

	<b>Gampaha</b>	<b>Kalutara</b>	<b>Rathnapura</b>	<b>Badulla</b>	<b>Hambantota</b>	<b>Matale</b>
Less than 1 acre	31762	22458	35199	26968	15487	14240
1.1-5 (acres)	72494	93778	177813	121578	143087	92328
5.1-10 (acres)	22298	24199	36488	33529	43901	24720
10.1-15 (acres)	10833	7891	11794	9402	11556	7102
More than 15 (acres)	12247	6214	12095	5866	8797	5917
Total (acres)	149634	154540	273389	197343	222828	144307

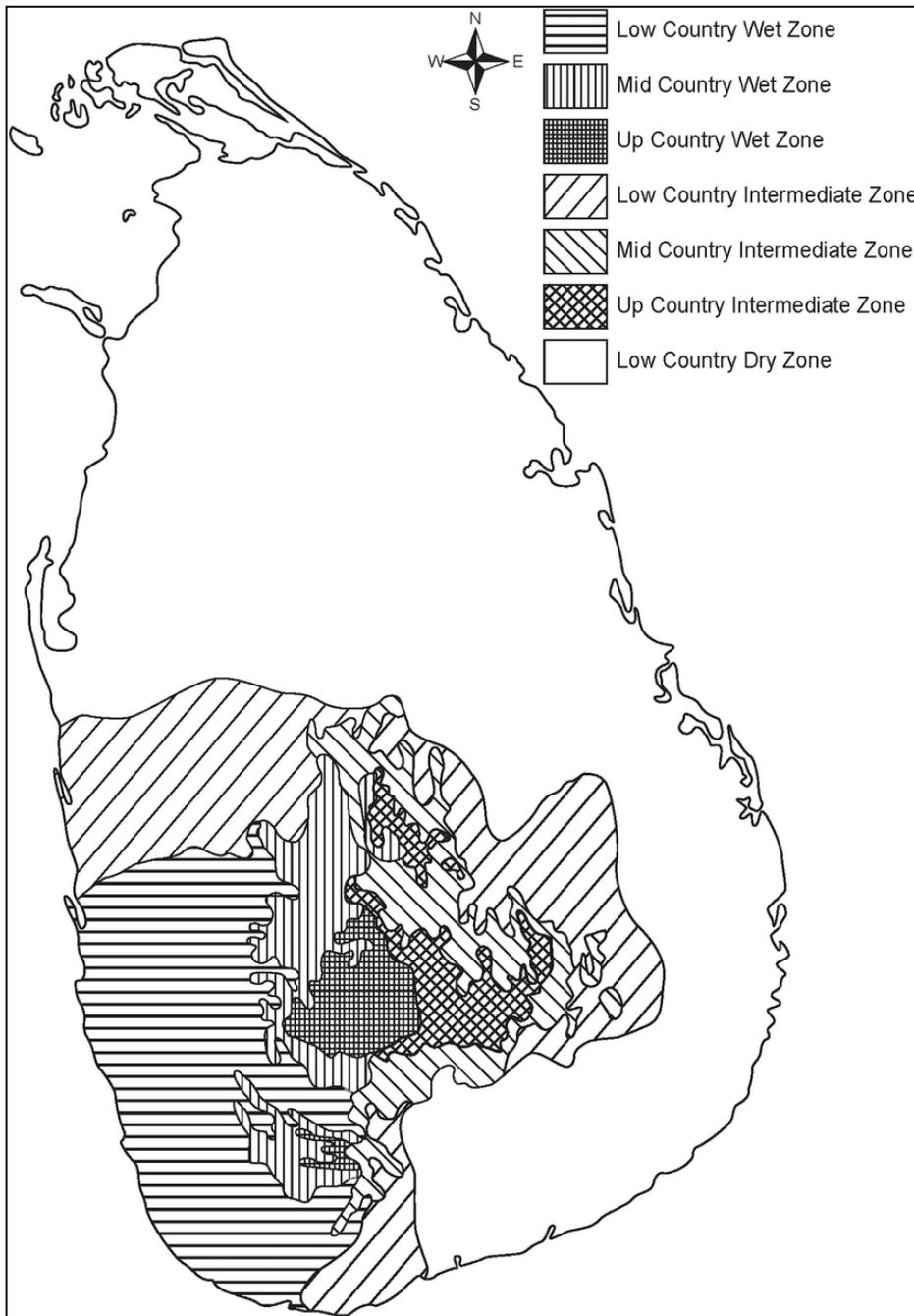
Source: Department of Census and Statistics (Agricultural Survey), 2012

**Table 2.8: Composition of Cultivated Lands in each District**

	<b>Gampaha (2015) (Hec.)</b>	<b>Kalutara (Hec.)</b>	<b>Rathnapura (Hec.)</b>	<b>Badulla (Hec.)</b>	<b>Hambantota (Hec.)</b>	<b>Matale (Hec.)</b>
Home Gardens	71918.4	43922	71699	1555	66015.4	38323
Paddy Lands	20654.2	16453	20002	31049.9	42572.4	22388
Perennial Crops	193.3	2646		16990	3775.2	19817
Major Crops (Tea, Rubber, Coconut)	23468.3	54154	93984	32110.14	14538.3	17250
Other Fields Crops(Seasonal Crops)	303.3	1343	19432	12535	9868	6840

Source: Department of Census and Statistics, 2018

Further, Figure 2.1 illustrates schematic representation of the seven agro-climatic zones of Sri Lanka.



Source: (Punyawardena, 2007)

**Figure: 2.7: Schematic Representation of the Seven Agro-climatic Zones of Sri Lanka<sup>2</sup>**

<sup>2</sup> where categorization is based on elevation above mean sea level (Low Country < 300 m, Mid Country ¼ 300-900 m and Up Country > 900 m) and annual rainfall zones (Dry < 1750 mm, Intermediate ¼ 1750-2500 mm and Wet > 2500 mm)

### **2.3 Special Advantages of Each District**

#### **Gampaha**

Farmers of Gampaha district are benefited by having the Katunayake International Airport close by. Hence, more farmers tend to produce for GAP for export purpose particularly bitter gourd and snake gourd. Moreover, excess can be sold to the Manning Market or nearby shops.

#### **Kalutara**

Farmers of Kalutara district are blessed by the Southern Express Highway and some of them practise export of bitter gourd. Moreover, as a general practice they sell their produce at the Meegoda Dedicated Economic Center.

#### **Rathnapura**

Particularly, farmers from Embilipitiya area are benefited by collecting centers in Embilipitiya and other supermarket collecting centers not specially as GAP producers but able to get a higher price for quality products (at the time of data collection period there was not a special area to sell GAP products at certain supermarkets).

#### **Badulla**

There are several fruit and vegetable collecting centers in Badulla district as it is famous for vegetable growing due to favourable climatic conditions. For instance, Keppetipola Dedicated Economic Center, Wangiyakumbura collecting centers and collecting centers of supermarkets in Bandarawela area can be mentioned. Furthermore, there is a good demand for quality products from hotels as more tourist hotels are located in Badulla and suburbs.

#### **Hambantota**

Hambantota is another main vegetable producing district and several collecting centers were located, particularly in Sooriyawewa area leading supermarkets have established such centers and farmers are getting benefit out of them. Furthermore, farmers are privileged of having the Southern Express Highway and in a shorter period they were able to transport their products to Colombo and suburbs.



## CHAPTER THREE

### Present Status of Small Scale GAP Farms in Selected Districts

#### 3.1 Types of Crops Cultivated

This study was carried in six districts and 85<sup>3</sup> GAP Farmers were included in the sample in each district. Accordingly, 85 farmers who joined the GAP programme in the six districts were interviewed. Farmers have cultivated different crops under the GAP programme and were subdivided into three (Table 3.1).

**Table 3.1 Division of Crops Cultivated for GAP**

<b>Open Field(Seasonal)</b>	<b>Net House Grown</b>	<b>Perennial</b>
Bitter gourd	Salad cucumber	Guava
Snake gourd	Bell pepper	Pineapple
Long beans	Tomato	Passion fruits
Ladies fingers	Iceberg	Rambutan
Thumba karvila	Capsicum	Papaw
Tomato		Katu anoda
Cabbage		Mango-Kartakolomban
Beans		TJC
Nai miris		Dragon fruits
Sweet melon		Pomegranate
		Jamanaran and Sweet orange
		Ash plantain

Source: HARTI Survey, 2018

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<sup>3</sup> Hence there were around 225 GAP Farmers (including large scale farms) there were limited number of GAP fields. At the period of data collection all the possible farmers of each (excluding large scale farms) were interviewed.

**Table 3.2: Crops Cultivated in Different Districts for GAP**

	<b>Open Field (Seasonal)</b>	<b>Net House</b>	<b>Perennial</b>
<b>Kalutara</b>	Bitter gourd, Snake gourd	Salad cucumber	Guava, Pineapple Passion fruits, Rambutan
<b>Gampaha</b>	Bitter gourd, Snake gourd, Long beans, Ladies fingers, Thumba karvila, Nai miris, Sweet melon		Pineapple, Rambutan, Katu anoda, Mango
<b>Badulla</b>		Salad cucumber, Bell pepper, Tomato, Iceberg. Capsicum	Mango
<b>Rathnapura</b>	Bitter gourd	Salad cucumber	Pineapple, Mango-TJC Banana, Dragon Fruit Pomegranate, Jamanaran and Sweet orange
<b>Hambanthota</b>	Bitter gourd, Pumpkin		Pineapple, Passion fruits Papaw, Mango, Banana, Ash plantain
<b>Matale</b>	Bitter gourd, Snake gourd Ladies fingers		Pineapple, Mango-Kartakolomban, Mango-TJC, Banana, Pomegranate

Source: HARTI Survey, 2018

Table 3.2 depicts crops cultivated in each district. Accordingly, 108 different crop fields were identified. There were Seasonal-Open Field Crop fields, 15 fields of Seasonal-Net house crops and 33 fields of Perennial crops. Table 3.3 shows the extent of GAP crop fields.

**Table 3.3: Extent of GAP Crop Fields**

	<b>Crop</b>	<b>Mean(ac)</b>	<b>Maximum(ac)</b>	<b>Minimum(ac)</b>
Open field (seasonal)	Bitter gourd	0.67	2	0.25
	Snake gourd	0.5	1.5	0.25
	Cabbage	0.25	0.25	0.25
	Beans	0.25	0.25	0.25
	Long beans	0.5	1.25	0.25
	Ladies fingers	0.75	1	0.5
	Thumba karavila	0.13	0.13	0.13
	Tomato (open field)	1.5	1.5	1.5
	Nai miris	0.5	0.5	0.5
	Sweet melon	0.25	0.25	0.25
	Pumpkin	1.5	2	1
Perennial/Semi perennial	Pineapple	2	6	0.5
	Passion fruit	0.63	1	0.25
	Rambutan	0.88	1	0.75
	Papaw	1.5	1.5	1.5
	Mango (TJC)	1.42	3.5	0.5
	Banana	1.8	5	0.5
	Dragon fruit	0.38	0.5	0.25
	Pomegranate	1	1	1
	Jamanaran and Sweet orange	1	1	1
	Ash plantain	1.5	1.5	1.5
Net house	Ice-berg (net house)	0.5	0.5	0.5
	Tomato (net house)	0.06	0.09	0.02
	Bell pepper (net house)	0.39	2	0.03
	Salad cucumber (net house)	0.22	0.75	0.02
	Capsicum (net house)	0.02	0.02	0.02

Source: HARTI Survey, 2018

### 3.1.1 Factors Considered for Crop Selection

It was vital to understand the factors influencing crop selection for GAP Farmers and accordingly 37.6 percent of the respondents cultivated the same crop consecutively whereas another 37.6 percent considered market price and 12.9 percent considered export market demand on the directions of DOA officers. In fact, only 11.8 percent of farmers cultivated crops that are mostly cultivated in the region at that time (Table 3.4)

**Table 3.4: Factors Considered for Crop Selection (Percentage of Farmers)**

<b>Factor</b>	<b>n=85<sup>4</sup> %</b>
Based on market price	37.6
Same crop cultivated	37.6
Based on export market demand	12.9
Cultivate crops popularly cultivated in the region at that time	11.8
Practice crop rotation plan	5.9
Considered special characters of crops (Low incidence of pest attacks/High yield crop/Disease resistant varieties (Panama)	5.9
Considered prevailing climatic conditions	4.7

Source: HARTI Survey, 2018

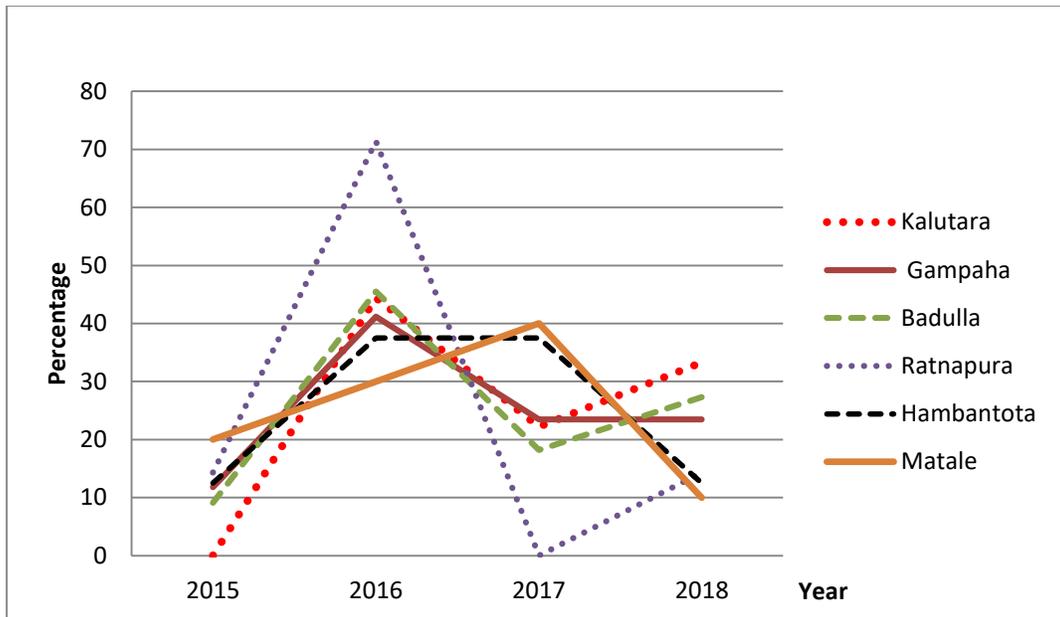
According to the findings, 76 percent who had Seasonal-Open Field Crops and 86.7 percent that had Seasonal-Net House Crops practiced crop rotation.

### 3.2 Introduction to SL GAP Programme

According to field observations SL GAP was initiated in 2015 (Figure 3.1) and year 2016 is recorded as the year in which the highest numbers of GAP Famers joined GAP and Table 3.5 shows who introduced them to the programme.

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<sup>4</sup> Based on number of respondents(n=85)



Source: HARTI Survey, 2018

**Figure 3.1: Adoption Rates of Farmers During 2015-2018**

**Table 3.5: Means through which Farmers were Introduced to GAP (Percentage of Farmers)**

Means	n=85 %
Agricultural Instructor(AI)s	42.4
Counsellor of Agribusiness(CAB) Officer	36.5
Technical Assistant(GAP)	20.0
Friends (Neighbouring GAP Farmers)	4.7
Self	1.2
Through Export Company	1.2

Source: HARTI Survey, 2018

### 3.3 Farmer Perception on GAP Programme

Initially farmers who joined GAP expected to obtain a high price or good income whereas only 36.5 percent had the desire to produce quality produce through GAP and Table 3.6 elaborates it.

**Table 3.6: Reasons to Initiate GAP Programme (Percentage of Farmers)**

Reason	n=85 %
Obtaining high income / higher price/stable price	82.4
To produce quality products	36.5
To join export market	12.9
Have a good relationship with officers	11.8
Minimizing market competitiveness	11.8

Source: HARTI Survey, 2018

**Table 3.7: Level of Satisfaction of Farmers**

Level of Satisfaction	n=85 (small scale) %
Very poor	25.9
Poor	27.1*
Moderate	11.8
High	28.2
Very high	7.1

\*Median

Source: HARTI Survey, 2018

Farmers were dissatisfied over unable to achieve expectations and significant variation was observed (IQR=3). Absence of a reasonable price and market were reasons for 45 respondents to be dissatisfied (Table 3.7).

Similarly, 77.6 percent farmers were planning to continue with the programme expecting to benefit in the future and 9.4 percent saw little advantage in joining this programme while 8.2 have decided to quit the programme.

### **3.4 Marketing of GAP Products**

#### **3.4.1 Export Market Potentials**

According to farmers, close to half of the total harvest was exported and the remaining was sold to the local market, whereas the little above the half of the farmers sold the harvest at the local market (Table 3.8).

**Table 3.8: Type of Market for GAP Products (Percentage of Farmers)**

	n=50 Open Field Crop Fields (Seasonal) %	n=15 Net House Crop fields %	n=43 Perennial Crop Fields %	n=108 Total Crop Fields %
Export and Local Market	78.0	13.3	11.6	42.6
Local Only	22.0	86.7	88.4	57.4

Source: HARTI Survey, 2018

Farmers take their products to pack - houses in Katunayake or suburbs by themselves for exportation. Bitter gourd and Snake gourd were the most popular export GAP crops as they received a handsome price compared to that in local market unless there was crop loss. It was observed that Long bean is gradually entering the export market (European Union) and few farmers who grew tomato in net houses and pineapple growing farmers also export their produce. Farmers growing crops in net house seasonally used to take harvest to buyers (73.3 percent of total number of crop fields) other crop products were sold at farmers' premises (Table 3.9). The amount of GAP products sold in supermarkets was negligible at the time of data collection; whereas later particular Supermarket chain started selling products under GAP title.

**Table 3.9: Means of Selling GAP Products (Percentage of Farmers)**

Means	n=50 Open (Seasonal) Crop Fields %	n=15 Net House Crop Fields %	n=43 Perennial Crop Fields%	n=108 Total Crop Fields %
Sent to the pack house to export and the remaining is sold locally	56.0	6.7	9.3	30.6
Local buyers came and bought	26.0	13.3	55.8	35.2
Products taken away to be sold	12.0	73.3	30.2	27.8
Sold to supermarkets	6.0	6.7	7.0	6.5

Source: HARTI Survey, 2018

Majority of farmers (80 percent) obtained export linkages through officers linked to GAP programme and according to the author's observations; it is not a reliable source of finding buyers as it was done when needed. Rejecting of products at the pack house occurred very rarely. At the same time, very few rejects were due to either quota being completed or observing defects in bitter gourd or being exposed to sunlight. Moreover, rejection of GAP products after being exported was not reported at all. Farmers face several issues while exporting GAP products to special markets such as the European

Union and the significant issue was finding buyers (84.8 percent of respondents). Further, unavailability of continuous demand, absence of expected price and increased production cost due to high transport cost were some other issues (Table 3.10).

**Table 3.10: Issues of Exporting GAP Products**

Issues	n =46 <sup>5</sup> %
Finding buyers	84.8
Unavailability of continuous demand	28.3
Absence of expected price	26.1
Increase of cost of production due to transport cost	23.9

Source: HARTI Survey, 2018

### 3.4.2 Marketing of GAP Products in Local Market

Almost all the farmers sell their produce at the local market even though few export and the remaining is sold at the local market. Special attention was drawn to improve the quality of products as GAP and majority did not receive a special price and nearly 70 percent for crop fields confirmed the same (Table 3.11). Hence, absence of growing foreign markets, and non-receipt of a higher price in the local market were issues faced by farmers.

**Table 3.11: Status of Crops in Local Market**

Whether GAP crops were given a Special Price	n=50 Seasonal- Open Field Crop Fields%	n=15 Seasonal-Net House Crop Fields%	n=43 Perennial Crop Fields%	n=108 Total Crop Fields %
Yes	32	40	24.4	30.2
No	68	60	75.6	69.8

Source: HARTI Survey, 2018

Major issues that farmers faced when selling products in the local market was lack of attention from the general public towards GAP products due to low publicity, which prevented them from fetching a better price for GAP crops (Table 3.12).

Level of publicity towards GAP Programme was unsatisfactory according to the results. There is less variation among the sample population in this regard.

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<sup>5</sup> Number exported

**Table 3.12: Issues of Selling GAP Products in Local Market (Percentage of Farmers)**

<b>Issue</b>	<b>n=85 %</b>
Less demand	62.4
No proper price for GAP products	57.6
No specific market to GAP products	36.5

Source: HARTI Survey, 2018

It is suggested to conduct more consumer awareness programmes, since presently the lackluster promotion initiatives have failed to create demand for GAP products (Table 3.13). Special outlets for GAP should be set up in places where demand for quality products in urban cities is high as the community is willing to pay a higher price for quality and safety products.

**Table 3.13: Suggestions to Improve Local Market for GAP Products**

<b>Suggestions</b>	<b>% n=85</b>
Increase consumer awareness in GAP	45.9
Establish special outlets for GAP products	43.5
Provide a guaranteed price for GAP products through government intervention	35.3

Source: HARTI Survey, 2018

### **3.5 Input Usage for GAP Crops by Farmers**

#### **3.5.1 Introduction**

The type and scale of input usage is especially considered when producing GAP products. Farmers are advised to use minimum level of chemicals for pest and disease control which have Minimum Residue Values (MRL) under the guidance and supervision of CAB officers and other relevant authorities. Further, chemical fertilizer should be used as recommended along with organic fertilizer. Seed and planting material from a reliable source should be provided whereas water quality and soil testing though not mandatory, should be done.

#### **3.5.2 Fertilizer Application**

According to farmers, nearly 70 percent applied only recommended levels of fertilizer for their GAP crops and 50.6 percent of them applied recommended levels of fertilizer for their non-GAP crops as a practice which is a positive trend. There were 3.5 percent of farmers who practiced organic farming. Further, only 10.6 percent of the sample population has applied organic fertilizer on crops.

### 3.5.3 Pesticides and Chemical Application

Majority of farmers applied chemicals after supervision by relevant officers and that ensured quality of products whereas nearly 33 percent applied chemicals by experience. It was identified that around 90 percent of the sample population observed pre-harvesting interval for each crop as recommended (Table 3.14).

**Table 3.14: Criteria of Determining the Chemical and Quantity to be Used**

Criterion	n=85 %
On the supervision of relevant officers	70.6
By experience	32.9

Source: HARTI Survey, 2018

According to Table 3.15, nearly half of GAP Farmers applied pesticides or other chemicals soon after tracing few pests, weeds or diseased plant for selected pests and weeds and only 17.6 farmers applied pesticides and other chemicals at Economic Threshold Level (ETL) for selected crops. Moreover, 8.2 percent of them did not use any type of chemicals.

**Table 3.15: Time of Pesticides or Other Chemical Applied**

Time Applied/ Type of Pesticide	n=85 Used for all Pest and Weeds %	n=85 Used for Selected Pest and Weeds%
Soon after tracing few pests, weeds or diseased plant	12.9	47.1
Above observation made in nearby farm	2.4	0.0
Applied as a precautionary measure	5.9	2.4
Applied at ETL	3.5	17.6

Source: HARTI Survey, 2018

GAP Farmers are advised to practice Integrated Pest Management (IPM) and only 57.6 percent used it particularly for bitter gourd and snake gourd where pheromone traps and other methods were used to trap fruit flies. This implies that 42.4 percent of farmers did not practice IPM.

Further, it is a good trend that majority of farmers used safety measures such as head covers, masks, shoes and goggles and stored pesticides and fertilizers in a separate place (Table 3.16).

**Table 3.16: Application of Safety Precautions**

Precaution	n=85 %
Use Head covers	90.6
Store pesticides and fertilizers in separate place	89.4
Use Masks	89.4
Use Shoes	87.1
Use Goggles	87.1
Do not eat when applying pesticides	84.7
Use Gloves	1.2

Source: HARTI Survey, 2018

### 3.5.4 Seed and Planting Material

Despite few incidence of disease (eg:“Maya” of Bitter gourd/ bunchy top disease of banana) the quality of seed and planting material was satisfactory.

### 3.5.5 Water and Soil

Water and soil are considered as determining factors of safe food production. Hence, water quality testing and soil analysis should be done to ensure quality. Most farmers were advised to get water and soil tested though not compulsory due to unavailability of testing facilities and only 31.8 percent of the total sample conducted water testing and only 44.7 percent of them conducted soil testing (Table 3.17).

**Table 3.17: Testing of Water and Soil Samples**

District	Sample Size	n=85 %	
		Water test Done	Soil Test Done
Kalutara	9	44.4	55.6
Gampaha	17	47.1	41.2
Badulla	11	63.6	9.1
Ratnapura	14	28.6	64.3
Hambanthota	24	12.5	58.3
Matale	10	10.0	20.0

Source: HARTI Survey, 2018

### 3.6 Compulsory Management Practices for GAP

Several criteria should be accomplished by GAP Farmers such as preparation of a separate place to store fertilizers and pesticides and other chemicals, covering the cultivated GAP

crop area using a net or other material, land preparation of a separate place to process the harvest, provision of sanitary facilities workers and welfare of workers, record keeping, workers' safety, practice soil conservation methods, crop rotation, maintaining pre-harvesting intervals and proper post-harvest handling.

### 3.6.1 Establishing Agronomic Practices and Other Practices: Inside the Farm

Some believe that converting a farm to a GAP farm is a tedious task. This survey revealed the contrary with regard to majority of farmers (64.7 percent). Preparation of a separate place to store fertilizers, pesticides and other chemicals, covering the land, arranging a separate place to process harvest and providing of sanitary and other basic facilities for employees were questioned from the GAP Farmers in order to check difficulties of establishing GAP farms and it was revealed only fewer farmers faced difficulties in fulfilling the above mentioned necessities respectively (Table 3.18).

**Table 3.18: Issues of Establishing Management Practices for GAP**

Issue	N=85 %
Preparation of a separate place to store fertilizers and insecticides	15.3
Covering cultivated area	25.9
Arranging a separate place to process harvest	15.3
Providing of sanitary facilities for employees	11.8
No issues	64.7

Source: HARTI Survey, 2018

### 3.6.2 Record Keeping

Record keeping is another very important requirement that should be practiced and 40 percent did not find it difficult. Moreover, nearly half of the farmers practice record keeping for non-GAP crops or at least for selected crops.

### 3.6.3 Welfare of Workers and Worker Safety

Workers' welfare is another important aspect and in the study sample majority of the GAP Farmers had first aid materials (82.4 percent) and safety equipment (83.5 percent). Moreover, 80 percent of them have established their workers a convenient place for eating and resting.

### 3.6.4 Soil Conservation Practice Used

Soil conservation is a best practice that should be conducted by GAP Farmers and particularly 63.3 percent did not report any sort of land issue and those with undulating land established drainages, which is a positive outcome of GAP, paying attention to soil conservation. Furthermore, 62.2 percent with problems of soil degradation have practiced establishing drainage facilities. (Table 3.19).

**Table 3.19 Farmers Practicing Soil Conservation Methods**

	<b>n=22 without issues %</b>	<b>n=45 who had problems %</b>
Establish drainages	63.6	62.2
Establish terraces	4.5	20.0
Establish ridge and furrows	9.1	17.8
Establish “ <i>Helmalu</i> ”		4.4
Covered with grass	22.7	17.8

Source: HARTI Survey, 2018

### 3.6.5 Post-Harvest Handling of GAP Crops (Inspection by the Authorized Officers)

Table 3.20 depicts how farmer fields of different crop types were inspected by authorized officers of DOA. Accordingly, 70 percent of the Seasonal-Open Field Crop Fields were inspected particularly because Bitter gourd and Snake gourd were exported and that should be inspected beforehand as a pre-requisite for exportation by the Quarantine Service. Significantly locally sold produce were not inspected or very rarely inspected after harvesting.

**Table 3.20: Inspection and Harvesting**

<b>Status</b>	<b>n=50 Open Field (Seasonal) Crop Fields %</b>	<b>n=15 Net House Crop Fields %</b>	<b>n=43 Perennial Crop Fields %</b>
Inspection done(while harvesting or in pack house)	70	33.3	14.0
No inspection done	20	53.3	76.7
Rarely inspected	10	13.3	4.7

Source: HARTI Survey, 2018

### 3.7 DOA Contribution towards Success of GAP Farmers

#### 3.7.1 Training Programmes

It was revealed that several training programmes were conducted for GAP Farmers including demonstrations in model farms, field day programmes, training programmes on GAP and other training programmes such as training on sprinkler irrigation and constructing poly-tunnels (Table 3.21). Further, such training programmes were acknowledged as useful and there is no discrepancy among the farmers in that regard (IQR= 0). The number of training programmes conducted was not sufficient and there is minimal disagreement among the farmers in this regard (IQR=1). Hence, it was widely believed that more programmes should be conducted for the accomplishment of GAP programme's goals and objectives.

**Table 3.21: Number of Training Programmes Farmers Attached to**

Programme	Maximum No.	Mean No.	n=85 (At Least One) %
Model farms	12	2	10.59
Field day programmes	7	2	24.71
Training programmes on GAP	10	2	57.65
Other training programmes (sprinkler irrigation/poly-tunnel)/awareness programmes	3	1	5.88

Source: HARTI Survey, 2018

#### 3.7.2 Auditing and Contribution of Officers

It was revealed that the farmers are satisfied with the auditing conducted by the officers, which implies that there is no discrepancy among the farmers in that regard (IQR= 0). According to the survey results, 76.5 percent GAP Farmers obtained GAP Certificate either at the initial stage of harvesting or during harvesting (Table 3.22).

**Table 3.22: Stages of the Crop when GAP Certificate Obtained (Percentage of Farmers)**

Time of Receiving Certificate	n=85 %
Initial stage of harvesting	45.9
During harvesting	30.6
Latter part of harvesting	7.1
End of harvesting	8.2
Certificate not received due to issues raised when auditing	3.5
The certificate not received and not concerned about it	4.7

Source: HARTI Survey, 2018

Perception of farmers regarding assistance of provincial AIs was at a satisfactory level and there were deviations in that regard in certain instances (IQR= 2). Table 3.23 shows how often the relevant officers visit the farmer field of GAP Farmers per month in the total sample population.

**Table 3.23: Mean Monthly Visits of Officers**

<b>Position</b>	<b>Mean Monthly Visits of Officers In charge</b>
CAB officer	3
AI	2
Technical Assistant(TA)	2

Source: HARTI Survey, 2018

### **3.8 Subsidies Provided Under GAP Programme for Farmers**

Few farmers (32.9 percent) were given equipments and materials as subsidies (Table 3.24). The subsidies that were granted included covering nets, baskets, covering bags, tent materials, safety suit/kits, pheromone traps, sprayers, sprinklers, cutters, GAP stickers and pruning kits for mango (Table 3.25)

**Table 3.24: Percentage of Farmers Granted Subsidies**

<b>District</b>	<b>N=85 %</b>
Kalutara	55.6
Gampaha	76.5
Badulla	9.1
Ratnapura	7.1
Hambantota	16.7
Matale	40.0
Total	32.9

Source: HARTI Survey, 2018

**Table 3.25: Percentage of Farmers Given Different Types of Subsidies**

Item	N=85 %
Covering net	24.7
Basket	20.0
Covering bags	5.9
Tent materials	4.7
Safety suit/kits	4.7
Pheromone traps	2.4
Sprayer	1.2
Sprinkler	1.2
Cutter	1.2
GAP stickers	1.2
Pruning kits	1.2

Source: HARTI Survey, 2018

### 3.9 Economics of GAP Crop and Non-GAP Crop (Selected crops)

Table 3.26 includes average cost/kg for GAP and Non-GAP crops, foreign market price/ kg (GAP) and local market price/kg for GAP and Non - GAP crops.

**Table 3.26: Economics of GAP Crops and Non-GAP Crops**

	Avg. Cost/kg (GAP)	Avg. Cost/kg (Non-GAP)	Avg. Foreign Market Price/kg	Avg. Local Market (GAP) Price/kg	Avg. Local Market(GAP) Price/kg
Bitter gourd	47.23	38.02	328.33	113.26	113.26
Snake gourd	50.02	44.37	145.38	66.69	65.54
Long bean	36.98	30.43	150.00	90.00	90.00
Salad cucumber	61.32	62.50		150.00	145.00
Bell pepper	73.10	81.41	300.00	291.67	290.00

Source: HARTI Survey, 2018

A paired-samples t-test was conducted to compare the cost of production (COP) for selected GAP and Non- GAP crops. Accordingly, (Table 3.26) there was a significant difference in the scores for GAP and Non-GAP Snake gourd and GAP Non-GAP Bitter gourd. These results suggest that GAP really have a higher COP for Snake gourd and Bitter gourd. Specifically when GAP is practiced for Snake gourd and Bitter gourd COP increases due to high labour cost for the covers<sup>6</sup>. In fact, for Long beans, Bell pepper and Salad

<sup>6</sup> It is not compulsory to cover the GAP products unless those are exported to EU.

cucumber there was no significant different for COP for GAP and Non-GAP crops (table 3.27 and table 3.28).

**Table 3.27: Paired Samples Test Results COP for Open-field (Seasonal) GAP Crops and Non-GAP Crops**

Crop/acre		Mean	Std. Deviation	t	df	Sig. (2-tailed)
Bitter gourd	GAP	246299.06	38468.22	16.789	22	0.000
	Non-GAP	108302.30	6231.11			
Snake gourd	GAP	198627.22	25762.95	10.665	12	0.000
	Non-GAP	106211.38	11448.45			
Long beans	GAP	124706.75	15854.85	2.050	3	0.133
	Non-GAP	102599.25	6387.35			
	Non-GAP	47107.50	2025.56			

Source: HARTI Survey, 2018 (author calculations)

**Table 3.28: Paired Samples Test Results COP for Net-house GAP Crops and Non-GAP Crops**

		Mean	Std. Deviation	t	df	Sig. (2-tailed)
Bell pepper/1000 sqft	GAP	58560.64	42157.16	-.368	5	0.728
	Non-GAP	64640.00	2297.84			
Cucumber/1000 sqft	GAP	48399.30	2090.36	1.050	3	0.371

Source: HARTI Survey, 2018 (author calculations)

### 3.10 Benefits of Joining GAP Programme for Farmers

According to the results of Principal Component Analysis, two factors were identified (from eight factors: increased their income reduced COP, increased per acre yield, yield increased extent cultivated, increased production and sales quantity increased use of advanced technology and used information technology) with respect to Extraction Sums of Squared Loadings. First factor (increased income) accounts for 48.04 percent of the variance and the second factor (increased use of advanced technology) accounts for 21.18 percent variance. Accordingly, two variables were selected and 69.22 percent of variance is explained. Moreover, according to the Friedman Test results there was no significant difference between two factors.

### 3.11 Perception of Farmers towards GAP Programme and Suggestions to Improve GAP Programme

Overall perception towards the GAP programme was examined and it was revealed that 89.41 percent of total responded GAP Farmers confirmed that it is a worthy programme. Following suggestions were presented by current practitioners of GAP programme towards sustainable progression of GAP programme benefiting both producers as well as consumers (Table 3.29).

**Table 3.29: Suggestions to Improve GAP Programme**

<b>Suggestion</b>	<b>n=85 %</b>
Establish GAP stalls	50.59
Provide farming equipment/ incentives / insurance for farmers	43.53
Conduct consumer awareness programme about GAP / increase advertising for GAP	42.35
Provide a better price / ceiling price for GAP products	31.76
Establish collecting centers /cold rooms	18.82
Conduct more farmer awareness programmes to promote GAP programme	12.94

Source: HARTI Survey, 2018

## CHAPTER FOUR

### Summary, Conclusion and Recommendations

#### 4.1 Summary

##### Farmer Perception about GAP Programme

- GAP practicing farmers' prime expectation was obtaining a high price or good income (82.4 percent of respondents) whereas few (36.5 percent) had the desire to produce quality produce through GAP.
- Farmers were dissatisfied over achieving their expectations whereas significant variation with that regard was apparent. Absence of a reasonable price and proper market were reasons for their dissatisfaction.
- However, 77.6 percent farmers were planning to continue with the programme hoping of reaping benefits in the future.
- Few (9.4 percent) believed that there is little advantage of joining this programme and 8.2 percent of the sample has already decided to quit the programme.
- Majority (89.41 percent) of farmers confirm that GAP programme is commendable.
- The farmers believed the level of publicity towards GAP Programme was unsatisfactory and there is less variation among the sample population regarding their opinion.

##### Adoption, Practices and Input Usage

- GAP certificate was obtained by majority of farmers (90.6 percent) at their first attempt and 55.3 percent were able to continue the GAP certificate consecutively. Fewer farmers highlighted that not continuing GAP certificate was due to losses in incidence of climatic changes.
- Fewer farmers were concerned about the market price (37.6 percent) and export market demand (12.9 percent) when crop selection was done and few (37.6 percent) continued to cultivate the same crop.
- According to majority of farmers (64.7 percent) converting a farm to a GAP farm was not a tedious practice. It was not a difficult task for them to prepare a separate place to store fertilizers, pesticides and other chemicals, covering the land, arranging a separate place to process harvest and providing sanitary and other basic facilities to employees.
- Crop rotation was practiced for majority of Seasonal-Open Field Crops and Seasonal-Net House Crops.
- Record keeping for their crops was not a difficult task for majority of farmers (60 percent) and fewer farmers have used it on Non-GAP crops as well.

- Soil conservation was practiced by majority of GAP Farmers (63.3 percent) even they did not have any land issue.
- Majority (70 percent) of Seasonal-Open Field Crop fields were inspected by officers as Bitter gourd and Snake gourd were exported and that should be inspected beforehand as a pre-requisite for exportation by the Quarantine Service. Significantly locally sold produce were not inspected or very rarely inspected after harvesting.
- Bitter Guard and banana farmers faced problems of viral diseases of planting materials used whereas seed and planting material utilized in general was at a satisfactory level.
- Majority of farmers (69.4 percent) applied only recommended levels of fertilizer for their GAP crops and 50.6 percent of them applied recommended levels of fertilizer even for their Non-GAP crops as a practice. Organic farming was practiced by 3.5 percent of the sample. Only 10.6 percent of the sample population applied organic fertilizer for their crops as an additional supplement.
- Majority of farmers applied chemicals on the supervision of relevant officers and that ensured quality of products whereas 32.9 percent of respondents applied chemicals by experience.
- Pre-harvesting interval was maintained by 89.4 percent of the sample population for each crop as recommended.
- Fewer (17.6 percent) farmers applied pesticides and other chemicals at the Economic Threshold Level (ETL) for selected crops and a considerable percentage (47.1 percent) applied pest and disease control measures only for selected crops soon after observing pest/disease and weed attacks. Moreover, eight point two percent of them did not use any type of chemicals.
- Majority of farmers used safety measures such as head covers, masks, shoes and goggles when applying chemicals and stored pesticides and fertilizers in a separate place.
- Integrated Pest management (IPM) was practiced only by 57.6 percent and it was particularly used for Bitter gourd and Snake gourd where Pheromone traps and other methods were used to trap fruit flies.
- Nearly 30 percent and 45 percent farmers have tested the soil and water respectively as they were advised to do so.
- Workers' welfare by providing first aid materials (82.4 percent), safety equipment (83.5 percent) establishing workers a convenient place for eating and resting (80 percent) was carried out by majority of farmers.

## **Marketing**

- Even though half of the sample believed that they have the potential to export with GAP programme only little above 40 percent of different sectors (open field seasonal, open field annual and net house seasonal) of crops cultivated export GAP products while the rest was sold in the local market

- Seasonal crops such as Bitter gourd and Snake gourd are the most popular GAP export crops and it was observed that exporting of Long bean was initiated. Fewer farmers growing tomato in net houses and those growing pineapple exported their produce.
- Majority of farmers obtained export accessibility through officers linked to GAP programme (80 percent exporters).
- Farmers were facing several issues while exporting of GAP products to special markets such as the European Union and a significant issue was finding buyers (84.8 percent). Further, absence of continuous demand, expected price and increase of COP due to transport cost were some other issues.
- Buyers usually come to farmers to purchase seasonal – open field crops and perennial crops whereas seasonal net house crop products were taken by farmers to buyers. This helped reduce intermediary intervention.
- Unavailability of a special market is another issue that farmers face when selling their products in local market and selling GAP products in supermarkets was negligible and discussions were conducted to allocate a separate space in supermarkets at the time of data collection and presently a particular supermarket chain has established GAP product stall.
- Major issues that farmers faced when selling their products in local market was lack of special recognition from the general public towards GAP products due to low publicity and that lead to low demand preventing a better price for GAP crops.

### **Economics and Outcome of GAP**

- There was a significant difference in the scores for average COP for GAP and Non-GAP for Snake gourd and Bitter gourd as COP for those two GAP crops really have a higher COP due to high labour cost. In fact, for Long beans, Bell pepper and Salad cucumber there was no significant difference for COP for GAP and Non-GAP crops.
- With regard to perception of farmers regarding positive outcomes of joining GAP programme seven factors were noted and only two factors such as increased per acre yield improvement and used information technology were significant with the least impact.

### **Training Programme and Other Facilities by DOA**

- Eventhough training programmes including demonstrations in model farms, field day programmes, programmes on GAP and other programmes were highly useful and timely, the number of training programmes conducted were not sufficient and it was widely believed that more programmes should be conducted for smooth functioning of GAP programme.
- Fewer farmers (32.9 percent) were given equipment and materials as subsidies.
- Farmers were satisfied with the auditing conducted (median 4). No discrepancy among the farmers (IQR - 0) was reported in that regard. Accordingly, 76.5 percent

GAP Farmers obtained GAP certificate either at the initial stage of harvesting or during harvesting.

- Perception of farmers regarding assistance of provincial AIs was at a satisfactory level (median-4) but there was discrepancy (IQR- 2) among farmers with that regard.
- Average monthly visits of relevant officers in charge of GAP varies from 2-3 per month.

#### **4.2 Conclusion**

- GAP is a timely and worthy programme with regard to food quality and safety.
- Farmers face several issues: finding of buyers, unavailability of continuous demand, absence of expected price (for certain crops) and increase of COP while exporting of GAP crops (for certain crops) for special markets such as the European Union.
- Less recognition for the GAP certificate is the main constraint for successful continuation of the programme.
- Perception towards the level of publicity by farmers towards GAP programme was low as there was no much demand for GAP products from the general public.
- Unavailability of special outlets to sell GAP products in the local market.
- Fewer farmers applied organic fertilizer for their crops as supplementary fertilizer and conducted water testing soil testing.
- Locally sold products were not inspected or very rarely inspected after harvesting.
- The number of training programmes conducted were not sufficient and more programmes are needed.

#### **4.3 Recommendations**

##### **Adoption**

- Frequent farmer awareness programmes through methods such as the Farmer Business Schools and field demonstrations need to be implemented. This would add business elements to GAP farming, enhancing adoption of good practices and linking to market assistance, in terms of information on potential export markets, linking to export markets and encouraging forward market contracts. This should be linked to the government strategy to increase the export potential to the country.
- Producer friendly GAP certification needs to be strengthened.
- The private sector needs to be encouraged to assist GAP Farmers, with material support, specially at the initial stage, hence more GAP farmers can be engaged into supply export quality goods.
- At first GAP Farmers should be provided with relevant farming equipment at concessionary rate.
- Introducing a crop insurance scheme for GAP Farmers would minimize the risk of crop loss due to pest and disease damages.

## **Marketing**

- Establishing special outlets for GAP should be done widely in urban cities where high affordability is prevalent for quality and safety products.
- Collecting centers and cold rooms should be established at least in major producing areas particularly for GAP products. A mobile marketing service of GAP products and use of GAP products for hospitals can be recommended.
- A reasonable price for GAP certified products should be assured by the government and the supermarkets to encourage GAP Farmers.
- GAP certification needs to be given more recognition, through consumer awareness programmes and advertising campaigns. This would enhance demand in local market and fetch a better price for GAP products.

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## Annex 1

### SL GAP Practices in Sri Lanka

#### Crop Management



Covering the field (Gampaha-Kirindiwela)

Frequent inspection by officers (Gampaha-Kirindiwela)



Application of IPM ( Pasyala)

Covering the fruits to protect from fruit fly(Pasyala)



Application of chemical at ETL (Gampaha)



Covering the fruits as per the level of maturity (Embilipitiya)



Numbering of plants (Balangoda)



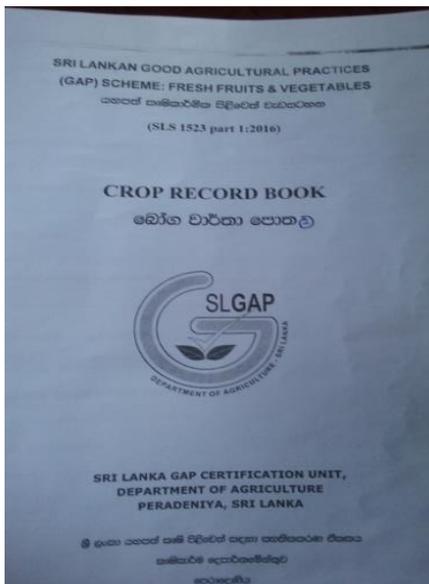
Demarcating different plots (Dambulla)



Proper management of the field (weed control etc) (Dambulla and Badulla )



## Record keeping



Record Keeping

## Auditing



Inspection by auditors (Dambulla)

## Post Harvesting Handling



Harvesting at correct maturity (Dambulla, Gampaha)



Use a separate place to store the harvest and pack in plastic crates to minimise the loss (Badulla)

## Storage of Chemicals Fertilizer and Other Safety Gear



Storage of chemicals Storage of safety gear



Storage of agricultural equipment

## Worker Safety and Welfare



First-aid facilities



A resting place for workers

## Obtaining GAP Certificate



GAP certificate after meeting the auditable requirements



GAP stickers GAP stickers (with QR code)