

EFFECT OF FERTILIZER AND OTHER AGROCHEMICAL IMPORT BAN: THE CASE OF THE FLORICULTURE SECTOR

G.G.de.L.W. Samarasinha
Thushara Dharmawardhana
Rifana Buhary



Effects of Fertilizer and Other Agrochemical Import Ban: The Case of the Floriculture Sector

**G.G.de.L.W. Samarasinha
Thushara Dharmawardhana
Rifana Buhary**

Research Report No: 259



May 2024

**Hector Kobbekaduwa Agrarian Research and Training Institute
114, Wijerama Mawatha
Colombo 07
Sri Lanka**

2024, Hector Kobbekaduwa Agrarian Research and Training Institute

First Published: 2024

ISBN: 978-624-5973-41-5

National Library and Documentation Services Board
Cataloguing-In- Publication Data

Samarasinha, G. G. de. L. W.

Effect of fertilizer and other agrochemical import ban : the case of the floriculture sector / G. G. de. L. W. Samarasinha, Thushara Dharmawardhana and Rifana Buhary. - Colombo : Hector Kobbekaduwa Agrarian Research and Training Institute, 2024.

x,43 p. ; 29 cm. - (Research report ; No. 259)

ISBN 978-624-5973-41-5

i . 631.8095493 DDC 23

ii. Samarasinha, G. G. de. L. W.

iii. Dharmawardhana, Thushara (co. author) iv. Buhary, Rifana (co. author)

v. Title

vi. Series

1. Fertilizer-Sri Lanka-Case studies

2. Sustainable agriculture-Sri Lanka-Case studies

3. Floriculture-Sri Lanka-Case studies

Hector Kobbekaduwa Agrarian Research and Training Institute
114, Wijerama Mawatha, Colombo 07
Sri Lanka

Final typesetting and lay-out by : Niluka Priyadarshani de Silva

Cover page design by : Udeni Karunarathna

Tel. Phone : +94 11 2696981
+94 11 2696437

Fax : +94 11 2692423

Email : librarian@harti.gov.lk

Web page : www.harti.gov.lk

FOREWORD

This report, based on a comprehensive study conducted by HARTI, delves into the repercussions of the fertilizer import ban on medium and small-scale growers within the floriculture sector.

The findings are revealed significant obstacles encountered by farmers in the floriculture industry. The scarcity and elevated costs of essential plant micronutrients and agricultural chemicals forced a majority of surveyed farmers to downsize operations, leading to a substantial decrease in household income derived from floriculture. Female farmers a significant portion of the sample that relied on floriculture as a supplementary source of income are particularly affected.

The report also sheds light on the broader impact on household food security, revealing that a considerable number of households relying on floriculture as a source of income are currently experiencing moderate to severe food insecurity.

As we navigate through intricacies of this multifaceted issue, this report serves as a vital resource for policymakers, stakeholders and the wider community to understand the challenges faced by the farmers engaged in the floriculture industry and to explore sustainable solutions to promote both economic viability and environmental stewardship.

Dr. G.G.Bandula
Director/Chief Executive Officer

ACKNOWLEDGEMENTS

The authors are so much thankful to Dr. G.G.Bandula, Director/CEO, HARTI for his guidance and support in finalizing and publishing this report. Constant support and useful suggestions provided by Mr. Malinda Senevirathne, former Director/CEO of HARTI, throughout the study is greatly appreciated. Also, we are so much grateful to the United Nations' World Food Programme (WFP) for assisting us through financial and technical collaboration to undertake this important study.

Special thanks are due to officials of Department of Agrarian Development and Department of Agriculture for their cooperation and support extended for this project. We are much thankful to the farming communities of the respective study locations for their valuable support during the data collection.

Authors deeply appreciate the valuable comments and suggestions provided by the external reviewers for the earlier version of this report. We are also thankful to Ms. Imasha Silva, Statistical Assistant of HARTI for lending her assistance to collect field data. The service provided by Management Assistants Ms. Niluka Priyadharshani de Silva and Ms. Gayathri Rathwatte of HARTI for typesetting, page setting the report, preparation of the final manuscript and in many other ways is highly appreciated. We also appreciate the service of Ms. Suharshi Perera for editing the final report. Mr. C.U. Senanayake for proofreading the final report is also appreciated. Finally, we are much grateful to Mr. W.H.A. Shantha, Head Information and Communication Division of HARTI and his team for making arrangements for printing and publishing the report.

G.G.de.L.W. Samarasinha
Thushara Dharmawardhana
Rifana Buhary

EXECUTIVE SUMMARY

In May 2021, the Government of Sri Lanka enacted the Import and Export (control) Regulations No. 7 which banned importation of chemical fertilizers and other agrochemicals to the country and declared a green agricultural movement. The objective was to make agricultural systems more financially and environmentally sustainable.

This swift change created a sense of uncertainty and unrest among farming communities who practiced input intensive agriculture throughout their life. Subsequently, the government lifted the ban on importing chemical fertilizers on 30 November 2021, allowing the private sector to resume importing chemical fertilizers. Yet, as a result of foreign exchange shortages and soaring international market prices, fertilizer importation did not reach the volume of imports that had prevailed before the financial crisis.

In addition to the food crop sector, this situation also had an impact on the floriculture industry. Although the floriculture industry in Sri Lanka generates relatively less foreign currency, it employs nearly 20,000 people directly and supports a similar number of people indirectly.

A study was conducted by HARTI to identify the effects of the import ban on fertilizer and other agrochemicals on farming communities growing flowering and non-flowering live plants, foliage and cut flowers. Considering the fact that large scale growers are much more resilient to short term shocks, only medium and small scale growers were considered in this study. Data collection was done through key informant interviews and by interviewing individual farmers using a semi structured questionnaire. The questionnaire survey was carried out between October and November of 2022. The respondents were 142 farmers from the four districts namely Badulla, Kandy, Colombo and Gampaha where the floriculture industry is well established.

Farmers involved in the floriculture industry is presenting significant obstacles due to input scarcity and elevated cost of certain plant micronutrients and other agricultural chemicals that are essential for their crop growth. These inputs cannot be replaced with organic alternatives or manufactured by farmers themselves. Consequently, around 86 percent of farmers downsized their operations, leading to a substantial decrease in

household income derived from floriculture. In addition, the shortage of these inputs has restricted farmers from cultivating certain plant varieties that have a high demand in the market. Female farmers, who constituted a significant portion of the surveyed sample, used floriculture as a supplementary source of income for their households but are now unable to do so due to these constraints. Farmers are of the view that most of the organic fertilizers and agrochemicals currently available in the market are of inferior quality and therefore not very effective. Non chemical pest and disease control methods have failed to compensate for the effects of agrochemicals in growing floricultural crops.

According to the household food security assessment done by using the World Food Programme's (WFP) methodology for evaluating household food security, it has revealed that a considerable number of households that rely on floriculture as one of their income sources are presently experiencing moderate to severe food insecurity.

LIST OF CONTENTS

	Page No.
FOREWORD _____	i
ACKNOWLEDGEMENTS _____	ii
EXECUTIVE SUMMARY _____	iii
LIST OF CONTENTS _____	v
LIST OF TABLES _____	viii
LIST OF FIGURES _____	ix
LIST OF ABBREVIATIONS _____	x
CHAPTER ONE _____	1
Introduction _____	1
1.1 Background	1
1.2 Rationale of the Study	2
1.3 Objectives	2
CHAPTER TWO _____	5
Research Methods _____	5
2.1 Conceptual Framework.....	5
2.2 Sample Selection.....	5
2.3 Data and Methods of Data Collection	7
2.4 Data Analysis.....	7
CHAPTER THREE _____	8
General Background of the Sample Farmers _____	8
3.1 Demographic Parameters	8
3.2 Method of Cultivation.....	9
3.3 Income from Floriculture	11
CHAPTER FOUR _____	12
Effects of the Import Ban on Floriculture Farmers _____	12
4.1 Average Share of Floriculture Income from Household Income ...	12

4.2	Reasons for Reduction of Income.....	12
4.3	Change in Scale of Operation.....	13
4.4	Use of Fertilizers	13
4.5	Requirement of Chemical Fertilizer	13
4.6	Source of Chemical Fertilizers for Purchase	14
4.7	Use of Organic Fertilizer	15
4.8	Issues in Using Organic Fertilizer	15
4.9	Use of Other Agrochemical (Pesticide, Weedicide).....	16
CHAPTER FIVE		18
Feedback from Farmers Involved in Floriculture Industry		18
Box story 1:	.....	18
	Feedback received from an Official of a leading Floriculture Sector Organization with much Enthusiasm for the Development of the Sector	18
Box Story 2:	.....	19
	Successful Orchid Grower in Divulapitiya (Ms. Indira Rohini)	19
Box story 3:	.....	20
	Views received from a Flower Arranger: Mr.A.A.G. Chandralal	20
Box story 4:	.....	20
	Flower Exporter (Mr. Sarath Handalage).....	20
Box story 5:	.....	21
	Views received from a Flower Grower: Mr.Dinam Dias	21
Box story 6:	.....	21
	Discussion with a Processor in Ornamental Plants as a Value-Added Product: Mr. Janaka Fernando.....	21
Box story 7:	.....	22
	Discussion with a Young Entrepreneur who Grows Flowers: Ms. Ganga Priyadarshani	22
Box story 8:	.....	22
	Views of a Female Small Scale Grower, an Enthusiast who makes a Living on Floriculture: Ms. Sakunthala Damayanthi	22
Box story 9:	.....	23
	Information received from a Retail Seller Engaging in Potted Floriculture Plants.....	23
CHAPTER SIX		24
Effects on Household Food Security of Farmers		24
6.1	Food Consumption Score (FCS).....	24
6.1.1	Steps of Constructing Food Consumption Score (FCS).....	24

6.1.2	Food Consumption Score Categories of Farmer Households	26
6.1.3	Consumption of Different Food Groups.....	27
6.2	Food Consumption Score – Nutrition (FCS-Nutrition)	28
6.3	Coping Strategies Employed due to Food Shortage	30
6.3.1	Steps of Constructing Reduced Coping Strategies Index (rCSI).....	30
6.3.2	rCSI Categories of Farmer Households.....	31
6.3.3	Food based Coping Strategies Employed.....	32
6.4	Food Security Status	33
6.4.1	Food Security Status and Current Status Domain of CARI Console for the Sample.....	34
6.5	Livelihood based Coping Strategies	36
6.5.1	LCSI Categories of Farmer Households	36
6.5.2	Livelihood based Coping Strategies Employed by Farmer Households	37
CHAPTER SEVEN		40
Key Findings and Recommendations		40
7.1	Key Findings	40
7.2	Recommendations	41
REFERENCES		42

LIST OF TABLES

	Page No.
Table 2.1: Distribution of Farmers Included in the Survey _____	5
Table 3.1: Demographic Parameters of Sample Farmers _____	8
Table 3.2: Percentage of Farmers Cultivated under Each Method _____	9
Table 3.3: Floriculture as the Main Source of Income _____	11
Table 4.1: Change of Share of Floriculture Income _____	12
Table 4.2: Type of Fertilizers Used by the Farmers after Policy Change _	13
Table 4.3: Reasons Why Farmers Find It Essential to Apply Chemical Fertilizers _____	14
Table 4.4: Different Sources of Chemical Fertilizers _____	15
Table 4.5: Application of Organic Fertilizers Before the Chemical Fertilizer Import Ban _____	15
Table 4.6: Difficulties in Using Organic Fertilizers Exclusively: Farmers' Perspective _____	16
Table 6.1: Weights of Coping Strategies in rCSI _____	31
Table 6.2: Food based Coping Strategies Employed by Farmer Households _____	33
Table 6.3: Livelihood based Coping Strategies Employed by Farmer Households by Severity _____	38

LIST OF FIGURES

	Page No.
Figure 2.1: Conceptual Framework for the Study _____	5
Figure 3.1: Anthuriums Grown in a Net House _____	10
Figure 3.2: Chrysanthimums Grown in a Poly tunnel _____	10
Figure 6.1: Food Groups and Weights _____	25
Figure 6.2: Food Consumption Score of the Farmer Households _____	26
Figure 6.3: Consumption of Different Food Groups by District _____	27
Figure 6.4: Consumption of Macro and Micro Nutrient Rich Foods by District _____	29
Figure 6.5: rCSI of Farmer Households by District _____	32
Figure 6.6: Food Security Status of Farmer Households by District _____	35
Figure 6.7: LCSi of Farmer Households by District _____	36

LIST OF ABBREVIATIONS

- CARI - Consolidated Approach for Reporting Indicators of Food Security
- ECMEN - Economic Capacity to Meet Essential Needs
- FAO - Food and Agriculture Organization
- FCS - Food Consumption Score
- GCE A/L - General Certificate of Education, Advanced Level
- GCE O/L - General Certificate of Education, Ordinary Level
- HARTI - Hector Kobbekaduwa Agrarian Research and Training Institute
- LCS-FS - Livelihood Coping Strategies for Food Security
- LCSI - Livelihood Coping Strategies Index
- MRI - Medical Research Institute
- rCSI - reduced Coping Strategies Index
- WFP - World Food Programme

CHAPTER ONE

Introduction

1.1 Background

Floriculture is a lucrative agribusiness in Sri Lanka, contributing to employment opportunities in rural and suburban areas, particularly for women growers (Padmini, 2016). It provides employment opportunities for approximately 20,000 individuals directly and supports an equal number of people indirectly (TAMAP, 2020). The country's rich botanical diversity and favourable growing conditions make it an ideal location for cultivating a wide range of floricultural species. Internationally Sri Lanka is recognized as one of the best quality floriculture production centers in the world. Further, the country's proximity to major markets such as Europe and Asia has made it an attractive destination for flower exports. Though the scattered nature of the floriculture sector makes it difficult to determine the exact size of production, in 2021, Sri Lanka generated approximately USD 16 million in revenue by exporting floriculture products (EDB, 2022).

Despite efforts by the government and non-governmental organizations to develop the sector, the full potential of floriculture in Sri Lanka remains untapped due to challenges such as inadequate infrastructure, technological limitations, and competition from other countries like Kenya, Ethiopia, and Colombia.

Moreover, recent policy changes, such as the ban on importing chemical fertilizers and agrochemicals, have affected the floriculture industry. In May 2021, the Government of Sri Lanka enacted the Import and Export (control) Regulations No. 7, which banned the import of chemical fertilizers and other agrochemicals into the country. Though it was executed with good intention of making agricultural systems more financially and environmentally sustainable, this swift change created a sense of uncertainty and unrest among farming communities who have been accustomed to input-intensive agriculture throughout their lives.

As a result, the floriculture industry in Sri Lanka faced significant challenges, as many of the crops grown in this sector are highly dependent on chemical fertilizers. This led to a decrease in the quality and quantity of flowers produced, as well as an increase in production costs. The industry struggled to meet the demands of both local and international markets, which led to

a decline in revenue and negative implications on the livelihoods of those employed in the sector.

While the ban on importing chemical fertilizers was lifted on 30 November 2021, allowing the private sector to resume importing chemical fertilizers, the situation has not yet returned to its previous state. Foreign exchange shortages and high international market prices have resulted in lower import volumes of agrochemicals than it was before the financial crisis. This continues to affect the floriculture industry in Sri Lanka, and it remains obscure how the industry will adapt and recover from these recent changes. To ensure the sustainability and competitiveness of the floriculture industry in the global market, it is crucial to invest in modern technology, improve infrastructure, and implement policies that support sustainable agricultural practices. These measures will enable Sri Lanka's floriculture sector to recover and thrive in the face of evolving challenges.

1.2 Rationale of the Study

Floriculture heavily relies on chemical fertilizers and agrochemicals for its production processes. The unavailability of these inputs limits access to essential nutrients for plant growth and makes it more challenging to manage pests and diseases, leading to lower yields and compromised product quality.

The global floriculture sector is a significant agribusiness industry and one of the fastest-growing markets worldwide. It plays a crucial role in providing income and rural employment opportunities for small, medium-scale, and large farmers, while generating foreign currency earnings for participating countries. Given Sri Lanka's substantial potential for growth in the floriculture sector, it is crucial to analyze and understand the implications of the import ban on fertilizers and agrochemicals on the farming communities engaging in cultivating floricultural products within the country.

1.3 Objectives

General Objective

The main objective of this study is to identify the immediate effects of the import ban on fertilizer and other agrochemicals on farming households engaging in the cultivation of floricultural products.

The specific objectives of the study

- To identify the effects of recent import ban on fertilizer and other agrochemicals on cultivating floriculture crops
- To identify the effects of the recent agrochemical import ban on income and food security of the households of floriculture farmers

Acknowledgements

This work was funded by the Australian Government Department of Foreign Affairs and Trade (DFAT) and supported by the United Nations World Food Programme (WFP) with technical expertise. The views and opinions expressed here are those of the authors.

CHAPTER TWO

Research Methods

2.1 Conceptual Framework

The theoretical framework used in this study was to find answers to the objectives of the study. The summarized conceptual framework of the study is given in the Figure 2.1.

2.2 Sample Selection

The import ban on chemical fertilizers and other agrochemicals was effective only for a short period of time. Considering the fact that large scale growers are much more resilient to short term shocks, only medium and small scale growers were considered in this study.

Cochran formula was used to calculate sample size given a desired level of precision, desired confidence level, and the estimated proportion of the attribute present in the population (Piran-Qeydari, Heidarabadi, and Farzaneh, 2022). It is considered especially appropriate in situations with large populations. For the present study, it was decided to keep the margin of error and confidence level as 5% and 95% respectively.

A list of floriculture producers registered in the Department of Botanical Gardens under “Suwahas Mal Association” and members of few other social media groups that are involved in floriculture was considered in drawing the sample for primary data collection. Based on that, 142 farmers cultivating floriculture products were contacted for the questionnaire survey. However, percentages were calculated considering the number of respondents who answered that specific question. Data collection was preceded in Badulla, Kandy, Colombo and Gampaha districts where the floriculture industry is flourishing (Table 2.1).

Table 2.1: Distribution of Farmers Included in the Survey

District	Number of farmers
Badulla	39
Kandy	35
Gampaha	34
Colombo	34

6

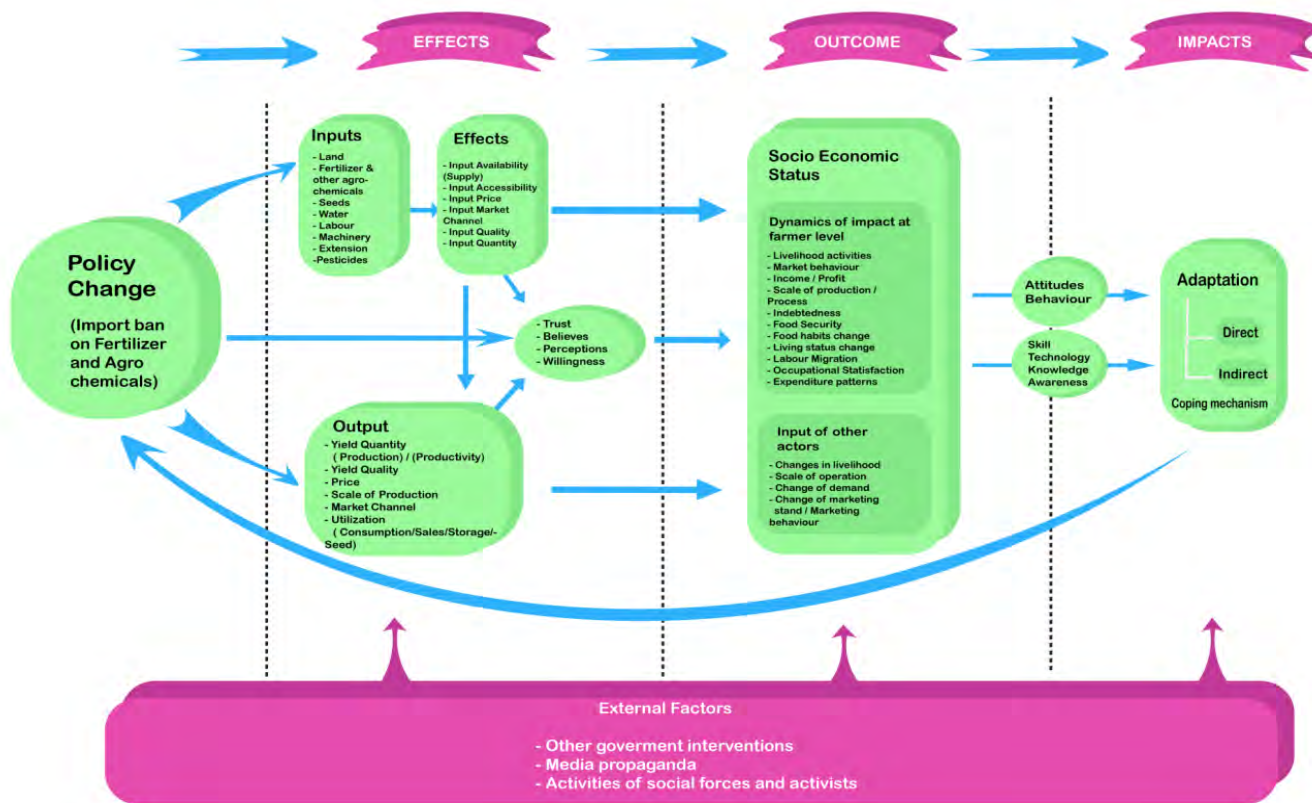


Figure 2.1: Conceptual Framework for the Study

2.3 Data and Methods of Data Collection

Data and Information

To investigate the research questions, the study used both primary and secondary data using several methods.

Data Collection Methods

Questionnaire Survey: Primary data for the study was obtained by using Computer-assisted personal interviewing (CAPI) techniques to conduct the structured questionnaire survey.

Focus Group Discussions (FGD): Focus Group Discussions was also conducted as they enable participants to reach a collective understanding, leading to valuable insights as well as the direct and indirect effects resulting from policy changes.

Key Informant Interviews (KII): In simple terms, key informant interviews involve interviewing a small group of people who are likely to provide important information, ideas, and insights on a specific topic. In this study representatives of floriculture farmer organizations, key-value chain actors/representatives, and ground-level officers who are working closely with the farmers were considered as key informants.

Case Studies: This study needs a holistic, in-depth investigation of socio-economic consequences of fertilizer and agrochemical-related policy change to the farming community engaged in growing floriculture crops. Therefore, several case studies were also done as case study method has the ability to go beyond the general picture and understand the depth of the consequences (Tellis, 1997).

2.4 Data Analysis

Data analysis was mainly descriptive to describe effects and relationships. Food security level was estimated using the Consolidated Approach for Reporting Indicators of Food Security (CARI) developed by the World Food Programme (WFP).

CHAPTER THREE

General Background of the Sample Farmers

3.1 Demographic Parameters

Table 3.1 provides an overview of the demographic parameters of the sample farmers of the study. The table examines various factors, including the gender distribution, age groups, educational background, and main sources of income for the principal farmers.

Regarding gender, the majority of respondents were female farmers, accounting for 67% of the sample, while male farmers constituted 33%. This indicates a significant representation of women in the farming households engaged in growing floricultural products.

Table 3.1: Demographic Parameters of Sample Farmers

Parameter	Measuring Criteria	Distribution of Respondents	
		No.	%
Gender of the Principal Farmer	Male	47	33
	Female	95	67
Age of the Principal Farmer	Age < 40 years	10	7
	age 40 – 49 years	41	29
	age 50 – 59 years	47	33
	age 60 – 69 years	35	25
	age > 70 years	9	6
Educational Status of the Principal Farmer	Secondary (6-11)	22	16
	GCE O/L passed	51	36
	GCE A/L passed	59	41
	Diploma or above	10	7

Source: HARTI Survey Data, 2022

In terms of age distribution, the principal farmers were categorized into different age groups. The highest proportion was in the age group of 50-59 years, representing 33% of the respondents, followed by the age groups of 40-49 years (29%) and 60-69 years (25%). Farmers below the age of 40 and

above the age of 70 constituted smaller proportions, at 7% and 6% respectively.

The largest group of the principal farmers had completed GCE A/L (General Certificate of Education, Advanced Level), accounting for 41% of the sample. This was followed by those who passed GCE O/L (General Certificate of Education, Ordinary Level) with 36%.

3.2 Method of Cultivation

Floricultural plants are grown mainly in open field as well as inside net houses or poly tunnels. Table 3.2 provide information regarding the percentage of respondents cultivate under each option, in open field, inside poly tunnels or in both open fields & poly tunnels in the four districts. In the district of Badulla, 26.67% of respondents had practiced open field farming, 43.33% had practiced poly tunnel farming, and 30% had chosen both options for cultivation.

For Gampaha, 23.33% of respondents had chosen open field farming, 30% had practiced poly tunnel farming, and 46.67% had cultivated in both options. The overall percentages across all four districts, shows that 18.18% of respondents had practiced open field farming, 39.09% had practiced poly tunnel farming, and 42.73% had chosen both options.

Table 3.2: Percentage of Farmers Cultivated under Each Method

District	Open field cultivation	Cultivate in poly tunnels	Cultivate in both open field & poly tunnels
Badulla	26.67	43.33	30.00
Colombo	7.14	39.29	53.57
Gampaha	23.33	30.00	46.67
Kandy	13.64	45.45	40.91
Grand Total	18.18	39.09	42.73

Note: Multiple responses are possible

Source: HARTI Survey Data, 2022



Figure 3.1: Anthuriums Grown in a Net House



Figure 3.2: Chrysanthimums Grown in a Poly tunnel

3.3 Income from Floriculture

Farmers cultivating floriculture crops are of two types. Some do it as their main source of income while the others do it as a secondary income source. According to the data provided in Table 3.3, of the 110 households responded to this question, 42 households (or 38.18%) rely on floriculture as their main source of income.

District wise, Badulla had the highest percentage of households for which floriculture is the main source of income at 50%, followed by Colombo and Gampaha at 14.29% and 19.05%, respectively. Kandy had the lowest percentage at 16.67%. Overall, the data suggests that while floriculture is an important source of income for a significant proportion of households in the selected districts, it is not the main source of income for the majority of households.

Table 3.3: Floriculture as the Main Source of Income

District	Main source of income is from floriculture	%	Main source of income is not from floriculture	%
Badulla	21	50.00		13.24
Colombo	6	14.29	22	32.35
Gampaha	8	19.05	22	32.35
Kandy	7	16.67	15	22.06
Grand Total	42	100	68	100

Note: based on the number of respondents answered for the question

Source: HARTI Survey Data, 2022

CHAPTER FOUR

Effects of the Import Ban on Floriculture Farmers

4.1 Average Share of Floriculture Income from Household Income

Data provided in Table 4.1 shows the changes of average share of floriculture income from total household income before and after the policy change in the four districts considered in the study.

Looking at the situation before the policy change, Badulla had the highest average share of floriculture income from household income at 66.79%, followed by Kandy at 41.36%. Colombo and Gampaha had much lower average shares at 28.37% and 33.6%, respectively. However, it could be observed that there is a significant decrease in the average share of floriculture income from the total household income across all districts.

Table 4.1: Change of Share of Floriculture Income

District	Average Share of floriculture income from Household income (%)	
	Before the import ban	After the import ban
Badulla	66.79	18.64
Colombo	28.37	8.70
Gampaha	33.60	18.37
Kandy	41.36	24.77
Grand Total	42.56	17.32

Source: HARTI Survey Data, 2022

4.2 Reasons for Reduction of Income

Respondents mentioned unavailability of fertilizer (38%) and other agrochemicals (12%), plants (4%), and other inputs such as pots and coir (23%) and also high transportation costs (16%) as the causes for reduced income from floriculture. Economic problems for customers such as higher living costs, reduced income due to COVID-19, who purchase floriculture items were also reported as a major factor that affected the floriculture income (64%). The socio-political circumstances as well as COVID – 19 pandemic situation also drew floral exhibitions to a close.

4.3 Change in Scale of Operation

The findings indicate that, majority of the farmers have reduced the scale of operation with the import ban on fertilizer enforced, considering mainly the high cost of production, unavailability of fertilizers and lack of agrochemicals to control pest and diseases. That change was observed in all four districts.

4.4 Use of Fertilizers

The data presents in the Table 3.4 shows the type of fertilizers used by growers in different districts after a policy change. Across all four districts, majority of the farmers have applied both chemical and organic fertilizers.

Table 4.2: Type of Fertilizers Used by the Farmers after Policy Change

District	Only chemical fertilizers	Only organic fertilizers	Both chemical & organic fertilizers	Not used any type of fertilizer
Badulla	23.33	13.33	63.33	0.00
Colombo	7.14	35.71	57.14	0.00
Gampaha	3.33	13.33	83.33	0.00
Kandy	18.18	18.18	59.09	4.55
Grand Total	12.73	20.00	66.36	0.91

Note: Percentage of respondents who responded to the question for each district

Source: HARTI Survey Data, 2022

4.5 Requirement of Chemical Fertilizer

A number of chemical fertilizers and nutrient mixers are applied on these plants to get desired qualities such as fragrance, colour mix etc, in flowers and foliage. Unavailability of chemical fertilizers in open market in close-by areas at an affordable price was the most common issue reported from most of the stakeholders who participated in the survey. Respondents were inquired about their view as to why chemical fertilizers are essential for floriculture production.

Table 4.3: Reasons Why Farmers Find It Essential to Apply Chemical Fertilizers

District	Rapid growth of plants	To minimize pest & disease attacks	Timely/frequent blooming of flowers	Imported/tissue cultured plants answer only to chemical plant	To get quality/strong plants/ colorful flowers	Due to easiness in applying
Badulla	88.89	18.52	81.48	7.41	14.81	0.00
Colombo	74.07	29.63	70.37	18.52	55.56	11.11
Gampaha	93.33	13.33	60.00	10.00	46.67	3.33
Kandy	76.19	19.05	52.38	9.52	19.05	4.76
Grand Total	83.81	20.00	66.67	11.43	35.24	4.76

Source: HARTI Survey Data, 2022

Table 4.3 provides the percentage of respondents in each district who identified specific reasons for considering agrochemicals as essential. When we consider the overall situation across all four districts, 83.81% of respondents mentioned chemical fertilizers are needed for rapid growth of plants, to minimize pest and disease attacks (20%), for timely and frequent blooming of flowers (66.67%). About 11% of the respondents mentioned that imported or tissue-cultured plants require agrochemicals for proper growth and production. Further, 35.24% of the respondents mentioned that chemical fertilizer helps production of quality and strong plants with colorful flowers, and 4.76% highlighted the ease of application.

4.6 Source of Chemical Fertilizers for Purchase

Table 4.4 presents a snapshot of the various sources that growers relied on acquiring fertilizers, indicating a range of approaches and preferences within the surveyed population.

The majority of respondents (60.91%) indicated that they purchased fertilizers from the open market. A significant portion of 31.82% reported utilizing fertilizers they had previously purchased and stored. A smaller percentage of 8.18% mentioned obtaining fertilizers from informal market sources. Only 0.91% of respondents reported directly purchasing fertilizers from the ASC (Agricultural Supply Corporation). A modest share of 4.55% of

the respondents obtained fertilizers through floriculture associations. Interestingly, 13.64% of the respondents stated that they did not purchase fertilizer all.

Table 4.4: Different Sources of Chemical Fertilizers

<i>% of respondents who responded to the question for each district</i>						
District	Available in the market (open market)	Previously purchased and stored	Informal market source	Purchased from the ASC	Floriculture associations	Didn't buy
	1.00	2.00	4.00	5.00	6.00	7.00
Badulla	83.33	20.00	6.67	3.33	0.00	0.00
Colombo	50.00	25.00	14.29	0.00	3.57	21.43
Gampaha	43.33	56.67	10.00	0.00	13.33	16.67
Kandy	68.18	22.73	0.00	0.00	0.00	18.18
Grand Total	60.91	31.82	8.18	0.91	4.55	13.64

Source: HARTI Survey Data, 2022

4.7 Use of Organic Fertilizer

As of Table 4.5, in all four districts majority of the farmers have applied organic fertilizers to cultivation well before the chemical fertilizer ban.

Table 4.5: Application of Organic Fertilizers Before the Chemical Fertilizer Import Ban

District	Yes	%	No	%
Badulla	23.00	76.67	7.00	23.33
Colombo	14.00	50.00	14.00	50.00
Gampaha	23.00	76.67	7.00	23.33
Kandy	13.00	59.09	9.00	40.91
Grand Total	73.00	66.36	37.00	33.64

Source: HARTI Survey Data, 2022

4.8 Issues in Using Organic Fertilizer

Though organic fertilizers in different forms were introduced as potential alternatives for chemical fertilizers, majority of the growers mentioned

several practical reasons that prevented them from applying them on floriculture plants.

Table 4.6: Difficulties in Using Organic Fertilizers Exclusively: Farmers' Perspective

Problem	Percentage of Respondents (Overall)
Results in slow growth rate of plant	57.01
Low resistant plants	53.27
Must apply a large amount of organic fertilizer to provide the required amount of NPK nutrients	12.15
Low quality flowers/plant	28.04
Not suitable for imported varieties	7.48
No idea	1.87
Only growth of leaves is observed; not the flowers (orchid)	10.28
High growth of weeds	1.87
Resulted in bad odour/number of mosquitoes, flies, worms increased	3.74

Source: HARTI Survey Data, 2022

Table 4.6 provides an overall perspective on the reported issues or observations related to the use of fertilizers among the respondents. The percentages represent the proportion of respondents who identified each specific concern or effect. Based on the data, the most commonly reported issues were "Results in slow growth rate of plant" (57.01%) and "Low resistant plants" (53.27%). Additionally, a notable percentage of respondents (12.15%) mentioned the need to apply a large amount of organic fertilizer to meet the required NPK nutrient levels as a difficulty. Other concerns included "Low quality flowers/plant" (28.04%), "Not suitable for imported varieties" (7.48%), and "Only growth of leaves is observed; not the flowers" (10.28%), among others.

4.9 Use of Other Agrochemical (Pesticide, Weedicide)

Organic pest and disease methods seems less effective in controlling pest and disease attacks in floricultural plants according to most of the farmers. Farmers have invested in high cost alternative products though without

much effect. Farmers complaint about absence of quality certification by an authorized institution for the products available in the open market.

CHAPTER FIVE

Feedback from Farmers Involved in Floriculture Industry

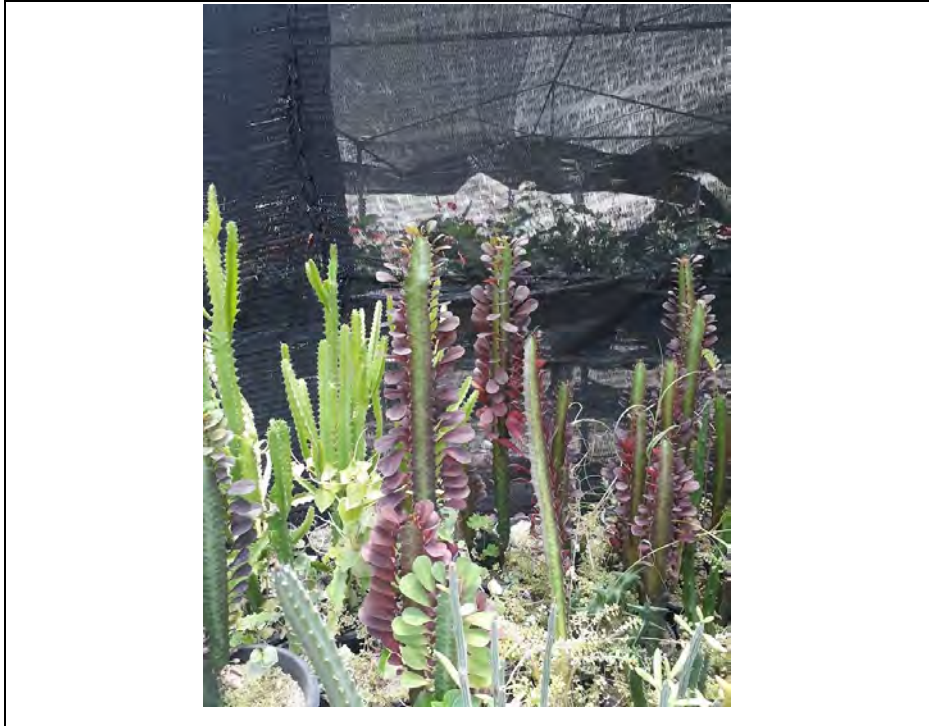
Box story 1:

Feedback received from an Official of a leading Floriculture Sector Organization with much Enthusiasm for the Development of the Sector

Plans are being developed to establish a Center for Floriculture Exporters close to Katunayake Airport with aid/ assistance from the World Bank. The University of Kelaniya has implemented research facilities for the purpose of doing research on floriculture. There is a high demand from foreign countries for both flowers and ornamental plants in our country, however the supply has been unable to keep up with the demand due to high rising in the manufacturing costs. At the same time, due to the rise in air freight costs, it has become more challenging to obtain orders from buyers from overseas. However, plants for landscaping and ornamental purposes can be supplied to nations like Thailand.

There are five centers identified for exporting flowers and ornamental plants. Hired labour to export value-added goods for flowers and ornamental plants has become a challenge. The "Mihikatha Abhimani" organization has set up district-level training programmes for small-scale flower and ornamental plant growers.

A huge demand on Sri Lanka's floriculture industry from other countries is observed during the Covid pandemic. Burial ceremonies in European nations typically involve the usage of flowers as the cause. In terms of local market's demand for floriculture, less number of flowers has been purchased for festive occasions as a result of the increase in flower costs. Considering wedding ceremonies, due to modern single-day events, the demand for flowers at weddings has also declined. Florists in this region mostly grow ornamental plants, including cacti, anthuriums, orchids, and Value Added Plants.



Box Story 2:
Successful Orchid Grower in Divulapitiya (Ms. Indira Rohini)

Ms. Indira from Divulapitiya is a successful orchid grower. Prior to the COVID-19 pandemic, she had taken assistance of two workers for her flower cultivation. However, as a result of the pandemic, she was unable to employ those two workers. Engaging in flower cultivation was her hobby sometimes ago, after joining the Green Lanka Association she has expanded this cultivation to a business. Due to current unavailability of chemical fertilizers and insecticides in the market, she has shifted to organic methods. She said that she used organic pesticides such as solutions prepared with banana blossoms, by boiling Anoda leaves and garlic, ginger and kochchi. As she mentioned, those methods were not successful. Organic fertilizers are not able to be used for orchids and anthuriums. Further, she said that granular fertilizers and albert solution are essential for orchid cultivation. In the past, Ms. Indira used a courier service to deliver flowers to her customers. However, she noticed that the demand for flowers has declined as a result of the prevailing economic crisis, which has limited people's purchasing power. During the COVID-19 pandemic, there has been a significant decline in demand in the market for cut flowers.

Box story 3:**Views received from a Flower Arranger: Mr.A.A.G. Chandralal**

Twenty growers provide cut foliage to Mr. Chandralal's flower arrangement business. The ban on chemical fertilizers has caused a 3%–4% decline in the production. There are 15 collectors who use the produced foliage from him. Roughly, around 3000kg worth of export orders are received each month. Currently, it is challenging to obtain the required quality for export.

Cut foliage prepared by him is exported to Japan, European and Middle Eastern countries. A permanent staff of 32 people works under him. Per day Rs. 1250/= is paid as rent for a woman and for a male employee it is Rs.2000/=. When the number of orders increases, external workers are employed on the basis of daily rental payments as mentioned earlier. Cut foliage sent to Japan is applied with chemicals sprayed to it. This time, he had to pay more for them due to the chemical ban. At the same time, they had to pay more to purchase cardboard boxes while exporting cut foliage. Mr. Chandralal cultivates ornamental plants on an 8 acres of land in addition to processing cut foliage and exporting it.

Box story 4:**Flower Exporter (Mr. Sarath Handalage)**

Mr. Sarath exports flowers and cut foliage to Dubai and Saudi Arabia. Within four months, the cost of an export carton, previously priced at Rs. 100/= has increased to Rs. 400/=. As he said, best quality flowers in the world are grown in African countries such as Kenya and Ethiopia. He mentioned that despite of restrictions on the import of chemical fertilizers, there was no decline in overseas orders. Previously, export of 850 kg of flowers, ornamental plants, and leaves incurred cost Rs. 100,000. However, as a result of the prevailing economic crisis, this cost has risen to Rs. 700,000.

Box story 5:**Views received from a Flower Grower: Mr.Dinam Dias**

The flowers and ornamental plants cultivated by Mr. Dias are taken and sold at the flower exhibition held by the Green Lanka Society once in every two weeks in Divulapitiya. He notes that in recent months, it has been difficult to locate the fertilizers and fungicides needed for flower cultivation. As a result, there was a 50% market decline. Coconut husks are boiled and diced at home for his crops, particularly for Anthurium varieties. Compost is not suited for flowers because it has poor drainage. It was therefore suggested that sticks, gravel and sand were used as the medium to grow anthurium.

Box story 6:**Discussion with a Processor in Ornamental Plants as a Value-Added Product: Mr. Janaka Fernando**

According to Mr. Janaka, ornamental plants are needed for his business venture. In order to arrange the plants more creatively and artistically, the leaves need to be longer and the number of leaves should also have to be a lot. According to him, chemical fertilizers are essential for this. Eight people are contributing to his business. He also mentioned that a woman is paid a daily wage of Rs.800/=. These creative ornamental plant arrangements are offered both to exporters and to domestic markets as well. He says that due to the current fuel and economic crisis in the country, the demand for his products in the local market has decreased. Apart from that, although he used to cultivate 15 acres of ornamental plants, he now has to reduce the cultivated area and only the ornamental leaves are used for creative arrangements.

The business suffered a major setback after last April. Mr. Janaka says that the prices of raw materials such as nets, pots, reeds, polythene and coir have gone up a lot. Since raw materials required for such a value added creative industry are not imported, they had to use locally available raw materials.



Box story 7:**Discussion with a Young Entrepreneur who Grows Flowers: Ms. Ganga Priyadarshani**

Mrs. Ganga has built her house on a 24 perch land and planted different types of flowers on every inch of the remaining land. She said that she gets a lot of support from all her family and that is why her business is becoming successful day by day. She is also getting a lot of support from the Green Lanka Association. A major issue she is facing is to find chemical fertilizers and insecticides. She must therefore manually get rid of insects like *pitimakuna*. It was also mentioned that she gets various chemical fertilizers and chemicals from the Green Lanka Association.

Box story 8:**Views of a Female Small Scale Grower, an Enthusiast who makes a Living on Floriculture: Ms. Sakunthala Damayanthi**

Mrs. Sakunthala Damayanthi is an enthusiastic woman who grows flowers from anthurium seeds and runs an anthurium farm in Divulapitiya. Mrs. Sakunthala maintains an attractive anthurium farm with anthurium flowers of various colours using artificially pollinated seeds. She provides these flower plants for sale to Green Lanka Association and also puts them on sale at various flower exhibitions. Further, her flowers were exported. Her cultivation has been gravely affected due to lack of access to agrochemicals such as chemical fertilizers and fungicides required for flower cultivation. Additionally, a member of her family has also received training related to tissue planting, and therefore Mrs. Sakunthala has been able to continue her anthurium cultivation more successfully.

Box story 9:
Information received from a Retail Seller Engaging in Potted Floriculture Plants

Ms. Nimala Kumari is doing sales in the Diyatha Uyana open market for several years. She sells plants grown by herself as well as plants from several other plant nurseries managed by another three women living closer to her house. With lockdowns during Covid 19 pandemic, the business suffered a setback. When were slowly recovering when the ban on chemical fertilizer import hit again. But with this sudden fertilizer policy shift, input costs skyrocketed and due to the recent high cost of living sales dropped again. “This is the time we need to earn some extra money to cover household expenses. But now we are in a position we can’t cover at least the transport cost”.



CHAPTER SIX

Effects on Household Food Security of Farmers

Household food security is crucial in attaining nutritious diet that leads to healthy life and household income has a critical role to play. Hence the forthcoming chapter explains the food security measuring indicators utilized by the World Food Programme (WFP) that measure the adequacy of household's current food consumption such as food consumption score, food consumption score-nutrition, reduced coping strategies index and livelihood coping strategies index with respect to floriculture farmer households.

6.1 Food Consumption Score (FCS)

Food Consumption Score (FCS) measures the current food consumption of households which contributes to the food security. FCS was developed by WFP in 1996. Households' dietary diversity, food frequency and relative nutritional importance of different food groups are required to estimate FCS which is a composite score. It is calculated using data of the frequency of consumption (in days) over a recall period of 7 days (WFP VAM Resource Centre, 2021a).

6.1.1 Steps of Constructing Food Consumption Score (FCS)

Step 1

Respondents were asked to mention the frequency of consumption of food items in days, over a period of past 7 days.

Step 2

Food items are grouped into 8 standard food groups with assigned weights excluding condiments (Figure 6.1).

Step 3

The consumption frequency of each food group is multiplied by with an assigned weight of respective food group which is based on its nutrient content.

Food Items	Food Groups	Weight
Maize, maize porridge, rice, sorghum, millet pasta, bread and other cereals	Cereals and Tubers	2
Cassava, potatoes and sweet potatoes		
Beans, Peas, groundnuts and cashew nuts	Pulses	3
Vegetables and leaves	Vegetables	1
Fruits	Fruit	1
Beef, goat, poultry, pork, eggs and fish	Meat and Fish	4
Milk yogurt and other dairy	Milk	4
Sugar and sugar products	Sugar	0.5
Oils, fats and butter	Oil	0.5
Condiments	Condiments	0

Source: WFP, 2008

Figure 6.1: Food Groups and Weights

Step 4

Those values are summed to estimate the FCS.

$$FCS = a_{staple}x_{staple} + a_{pulse}x_{pulse} + a_{veg}x_{veg} + a_{fruit}x_{fruit} + a_{animal}x_{animal} + a_{sugar}x_{sugar} + a_{dairy}x_{dairy} + a_{oil}x_{oil}$$

FCS Food consumption score

x_i Frequencies of food consumption = number of days for which each food group was consumed during the past 7 days (7 days was designated as the maximum value of the sum of the frequencies of the different food items belonging to the same food group)

a_i Weight of each food group

Step 5

Determine the household's food consumption status based on the following thresholds.

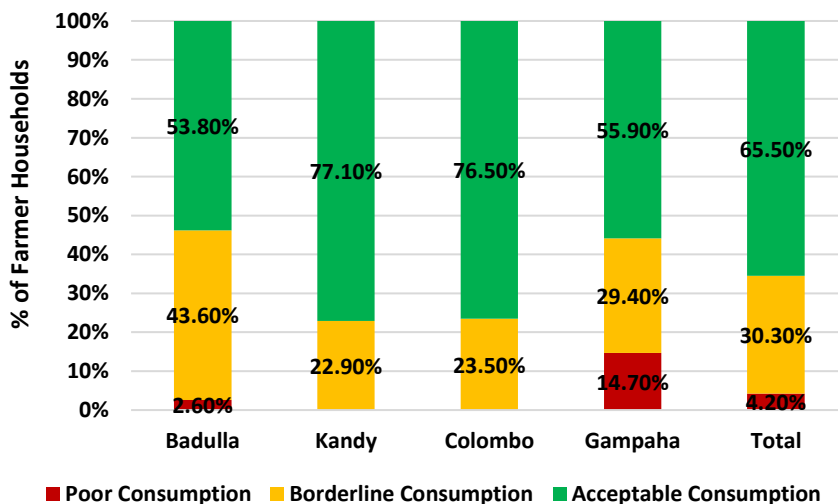
Threshold Level	Profiles
0-28	Poor Food Consumption
28.5-42	Borderline Food Consumption
>42	Acceptable Food Consumption

Source: WFP, 2008

6.1.2 Food Consumption Score Categories of Farmer Households

Figure 6.2 presents the FCS figures for the study sample that is engaging in floriculture in Kandy, Badulla, Gampaha and Colombo districts. Overall, nearly 66 percent of farmer households are categorized into acceptable food consumption profile since the estimated FCS values are greater than 42. This finding reflects that these floriculture farmers were not struggling with prevailing food crisis with respect to food consumption. Further, 30 percent of the total sample have borderline food consumption, which suggests that they may be experiencing some level of food insecurity and struggling to access enough food to meet their nutritional needs.

WFP (2022) found that a majority (60.4%) of individuals have an acceptable level of food consumption while a significant percentage (30.8%) have borderline food consumption. However, a small percentage (8.8%) of individuals have poor food consumption by end of August 2022. These figures are more or less similar with the study findings.



Source: HARTI Survey Data, 2022

Figure 6.2: Food Consumption Score of the Farmer Households

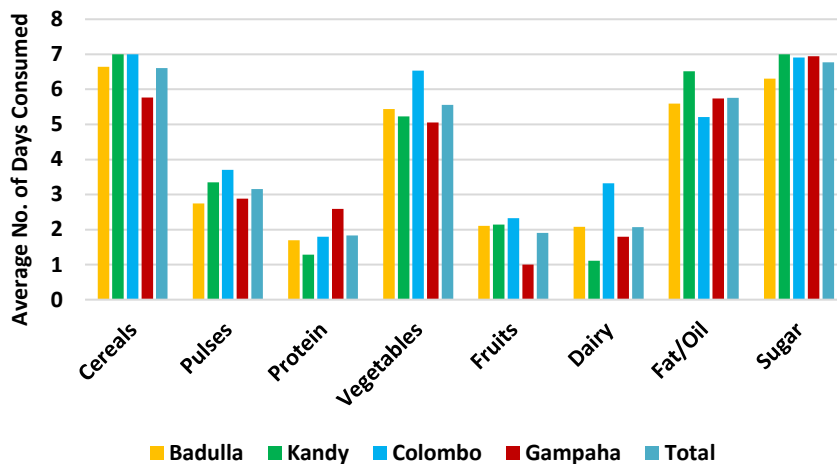
The data also reveals that floriculture farmer households in Kandy and Colombo districts, 77 percent have acceptable food consumption, which are higher than the overall percentage of acceptable food consumption of the total sample. This suggests that floriculture farmer households in said districts may have better access to nutritious food. Medical Research

Institute (MRI) (2022) stated that 96.6 percent of the households are in an acceptable level of food consumption at national level whilst 3.3 percent of households are in borderline level. Further, 0.1 percent of households belongs to poor food consumption category in their study.

It is noteworthy to mention that food consumption can be influenced by various factors such as income, education, access to healthcare and cultural factors. For instance, households with higher income and education levels may have better access to nutritious food and a better understanding of healthy eating habits. Additionally, cultural factors such as food preferences and traditional dietary practices can also affect food consumption.

6.1.3 Consumption of Different Food Groups

According to the WFP (2008), there are eight food groups namely; cereals, pulses, protein based food, vegetables, fruits, dairy products, fat/oil and sugar. As presented in Figure 6.3, average number of days consumed of cereals (7days), vegetables (6 days), fat/oil (6 days) and sugar (7 days) are quite higher numbers compared to dairy products (2 days), protein products (2 days) and fruits (2 days) of the total sample. Average number of days consumed of protein-based products and dairy products have declined during the reference period due to soaring prices in economic crisis.



Source: HARTI Survey Data, 2022

Figure 6.3: Consumption of Different Food Groups by District

As stated in WFP (2022), on average, households in Sri Lanka consume animal protein less than three days a week within a seven-day period. Similarly, the consumption rate of fruit and dairy products has been gradually decreasing every month since June 2022.

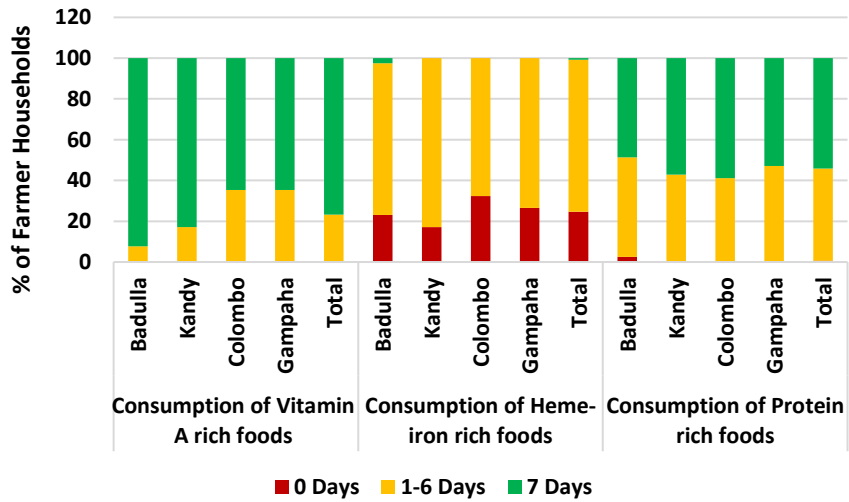
Further, WFP (2022) revealed that cereals (6.9 days) and vegetables (5.9 days) are the most frequently consumed food groups, followed by fat (4.4 days) and pulses (3.5 days). However, the consumption of proteins (2.4 days), fruits (1.8 days) and dairy products (0.5 days) are relatively low, with dairy products being the least consumed food group. As stated in the above paragraphs, study findings are more or less similar to the findings of WFP (2022) with slight fluctuations.

6.2 Food Consumption Score – Nutrition (FCS-Nutrition)

Food Consumption Score-Nutrition (FCS-Nutrition) is a measure of adequacy of households of key macro and micro nutrients rich food groups. This indicator is comprised of frequencies of consumption of Vitamin A-rich, Heme iron and protein-rich foods over the past seven days prior to the survey. Following food groups have been identified under the three main categories when using in constructing FCS-Nutrition.

- Vitamin A-rich foods – dairy products, organ meats, eggs, orange vegetables, dark green leafy vegetables and orange fruits.
- Heme iron-rich foods - flesh meats, organ meats and eggs
- Protein rich foods - pulses, dairy products, flesh meats, organ meats, fish and egg.

Figure 6.4 elaborates the estimated FCS-Nutrition figures of the study sample.



Source: HARTI Survey Data, 2022

Figure 6.4: Consumption of Macro and Micro Nutrient Rich Foods by District

Least percentage of the total farmer households (0.7%) has never consumed protein-rich foods over the past seven days prior to the survey while none of the farmer households was consumed vitamin A-rich foods ever. The rising cost of protein-rich foods, such as eggs, meat, lentils, and milk has made people inaccessible to low-income individuals and groups, placing vulnerable populations such as children, the elderly, pregnant women and lactating mothers at risk of food and nutritional insecurity.

Nearly 25 percent of the total farmer households has never consumed heme iron-rich foods seven days prior to the survey. Heme-iron is a type of iron that is found in animal-based foods such as meat, poultry, and fish. It is more easily absorbed by the body compared to non-heme iron found in plant-based foods such as beans, lentils, and spinach. A deficiency in iron can lead to anemia. In order to address this issue, it may be necessary to increase the access to heme-iron rich foods.

However, majority of the sample (74.6%) has sometimes consumed heme iron-rich foods whilst nearly 54 percent of the farmer households has consumed protein rich foods at least daily. Despite of being majority lies in the consumption of protein rich foods and vitamin A-rich foods at least daily, a negligible amount of the farmer households (0.8%) has consumed heme iron - rich foods at least daily. Apparently, these findings would inform the

designing of nutrition sensitive programmes in targeted areas in the country.

6.3 Coping Strategies Employed due to Food Shortage

As per the definition of WFP (2021b), the reduced Coping Strategies Index (rCSI) is used to compare the hardships faced by the households due to shortage of food. This index measures frequency and severity of the food consumption behaviours the households had to engage in due to food shortage in the 7 days leading to the survey.

This index measures behavioural strategies that people apply when they cannot access enough food or when they predict a decrease in food security. rCSI has several applications. It is used to monitor, provide quick status indicator of the extent of food insecurity that leads to immediate programmatic decision making. Further, rCSI is used to monitor the impact of interventions including food aid on household food insecurity particularly in emergencies. It has also been used in monitoring process as a food insecurity early warning indicator (TANGO International, 2008).

6.3.1 Steps of Constructing Reduced Coping Strategies Index (rCSI)

Step 1

Coping behaviours - making a list of coping strategies.

Step 2

Frequency - counting the frequency of strategies.

Step 3

Severity - categorizing and weighting the strategies.

Table 6.1: Weights of Coping Strategies in rCSI

During the last 7 days , were there days (and, if so, how many) when your household had to employ one of the following strategies (to cope with a lack of food or money to buy it)?	Severity Weight
1. Relied on less preferred, less expensive food (rCSILessQty)	1
2. Borrowed food or relied on help from friends or relatives (rCSIBorrow)	2
3. Reduced the number of meals eaten per day(rCSIMealNb)	1
4. Reduced portion size of meals(rCSIMealSize)	1
5. Reduction in the quantities consumed by adults/mothers for young children(rCSIMealAdult)	3

Source: WFP, 2021b

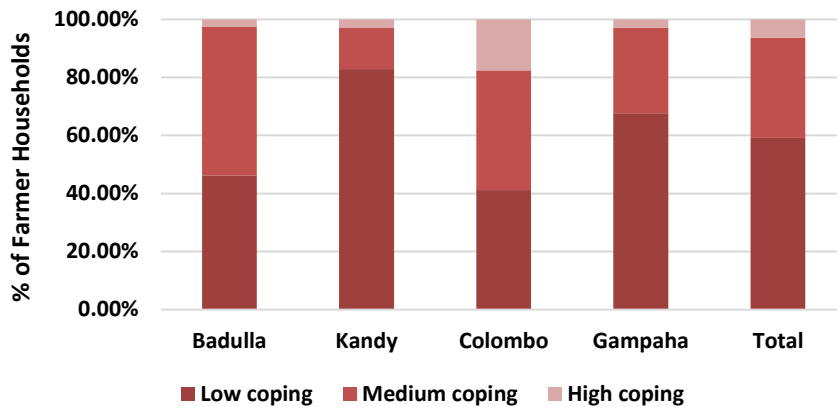
Step 4

Scoring - combining frequency and severity for analysis.

$$rCSI = \text{sum}(rCSILessQty*1, rCSIBorrow*2, rCSIMealNb*1, rCSIMealSize*1, rCSIMealAdult*3)$$

6.3.2 rCSI Categories of Farmer Households

In the sample, most of the farmer households are having “0” for rCSI value that implies less food insecurity (more food security) than higher rCSI values in the sample. The highest value in the sample for the rCSI is 42 and it reflects the highest food insecurity (less food security) compared to “0” rCSI value in the same sample. Further, it is possible to mention that two farmer households can have the same value for rCSI, but both are using different strategies to cope with food insecurity leading to maintain the equal level of food security. The rCSI is categorized into three groups: low (0-3), medium (4-18), and high (19 and above).



Source: HARTI Survey Data, 2022

Figure 6.5: rCSI of Farmer Households by District

Figure 6.5 indicates that the least proportion of the study sample, 6.3 percent, is highly dependent on coping strategies to have food on the table. This implies that a certain level of food insecurity is evident and may not have consistent access to sufficient and nutritious food to meet their dietary needs. Another 34.5 percent of the study sample is relying on medium-level coping strategies, suggesting that they are also facing some challenges in accessing sufficient and nutritious food. Only 59.2 percent of the population reported low-level coping strategies, which suggests that they are better equipped to manage their food needs without significant reliance on coping strategies.

It is noteworthy to mention that food insecurity can have severe consequences on the physical and mental health of individuals and communities. Therefore, understanding coping strategies used by individuals and communities can help identify the gaps in food security and resources needed to address the issue. In addition, these findings are more or less similar to the finding of the WFP (2022) that states 79 percent of the population is dependent on food based coping strategies.

6.3.3 Food based Coping Strategies Employed

Table 6.2 presents the coping strategies employed by the sample farmer households in order to have food on the table. The following table indicates that a significant proportion of the sample (52.1%) consumed less preferred

and less expensive food to manage their food needs. This may suggest that they were facing financial constraints or limited access to nutritious food.

Consuming less preferred and less expensive food may lead to a lack of variety in the diet, which can impact the nutritional quality of the diet and overall health. Additionally, 21.9 percent of the sample has restricted food consumption by adults. Despite of adapting various strategies, efforts are needed to address the root causes of food insecurity and ensure equal access to healthy and affordable food.

Table 6.2: Food based Coping Strategies Employed by Farmer Households

Coping Strategy	District	Percentage of Farmer Households			
	Badulla	Kandy	Colombo	Gampaha	Total
Less preferred and less expensive food	79.5	25.8	55.7	44.1	52.1
Borrow food	7.7	2.9	0	5.9	4.2
Reduce the number of meals eaten	2.6	2.9	8.7	2.9	4.2
Limit portion size of meals	12.8	5.8	49.9	17.5	21
Restrict consumption by adults	28.9	8.7	44	5.8	21.9

Note: The sum of the percentages of farmer households exceeds 100 due to multiple coping strategies employed by farmer households.

Source: HARTI Survey Data, 2022

As stated in the study by WFP (2022), around eight in ten households are regularly adapting food based coping strategies. Nearly 78 percent of its sample households relied on less preferred food, 49 percent has limited their portion sizes and 39 percent has reduced the number of meals.

6.4 Food Security Status

Food security is a grave concern in Sri Lanka as well in the world today due to rapid rising of food inflation. Food and Agriculture Organization (FAO) (1996) defined food security as “food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food, that meets their dietary needs and food preferences for an active and

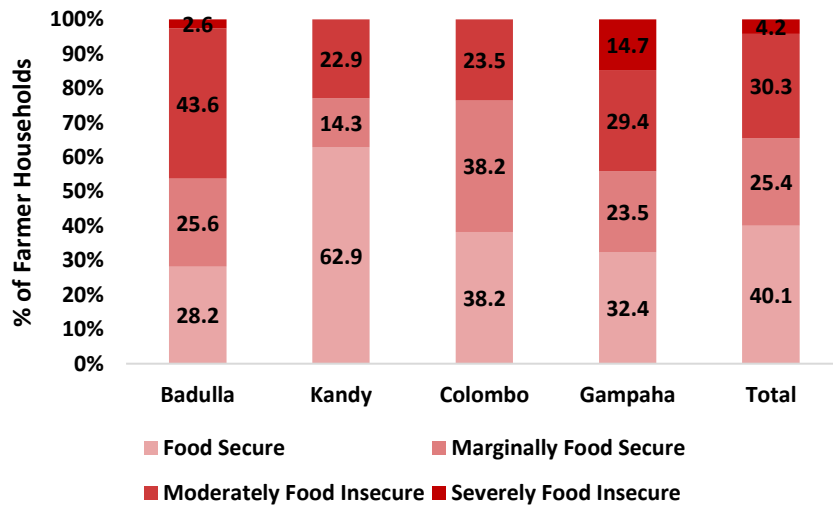
healthy life. Three pillars of the food security come under food availability, food accessibility and food utilization.

WFP (2021c) developed a reporting method of food security indicators as an aggregate named Consolidated Approach for Reporting Indicators of Food Security (CARI). It facilitates to aggregate various food security indicators into composite index which enables to report the overall food security status of the population.

Further, CARI allows to assess availability and accessibility of food by determining the adequacy of household's current food consumption (Current Status Domain) whilst the coping capacity (Coping Capacity Domain) by economic vulnerability and livelihood coping strategies. Coping capacity reflects the capability of a household to sustain the food consumption over time. Current Status Domain is being estimated using Food Consumption Score (FCS) and reduced Coping strategies Index (rCSI). Coping Capacity Domain is estimated using Livelihood Coping Strategies for Food Security (LCS-FS) and Economic Capacity to Meet Essential Needs (ECMEN). Food Security Console or CARI Console is divided into four categories: 1. Food Secure, 2. Marginally Food Secure, 3. Moderately Food Insecure and 4. Severely Food Insecure (WFP, 2021c).

6.4.1 Food Security Status and Current Status Domain of CARI Console for the Sample

FCS and rCSI are combined to estimate the current status domain in CARI Console. Figure 6.6 presents the current status domain in CARI Console for the floriculture farmers covering four districts. Figure 5.6 further reflects that how the sample farmer households are distributed among the four standard categories of food security. Majority (40.1%) of the sample lies under the category of food secure. This category was built using acceptable food consumption of FCS and rCSI below four. The minority of the sample (4.2%) comprises of severely food insecure category.



Source: HARTI Survey Data, 2022

Figure 6.6: Food Security Status of Farmer Households by District

The farmer households in the sample were not affected by the food inflation currently being experienced by the nation. Nearly 65 percent of the sample comes under the food secure categories which support the aforementioned fact. However, as stated in WFP (2022), Sri Lanka has a food insecurity rate of over one-third (37%) of its population. This finding is somewhat similar to study sample finding (34.5% of food insecurity).

Out of the total population, 16 percent is classified as food secure, meaning that they have enough access to food and are not experiencing any form of food insecurity. In addition, 33.8 percent are moderately food insecure, indicating that they often face limited access to food and may be forced to adapt food based coping strategies (WFP, 2022). Further, WFP reports that as of July 2022, 6.3 million people are moderately acute food insecure, while 66,000 people are severely acute food insecure based on the CARI methodology (WFP and FAO, 2022). It is timely requirement to scale up food assistance via in kind or cash to vulnerable groups in the society, expand the national nutrition programmes conducting and ensuring the continuation of school meals programmes. Consequently, it leads to enhance the food security of the population while ensuring the nutritional requirement and health secured nation.

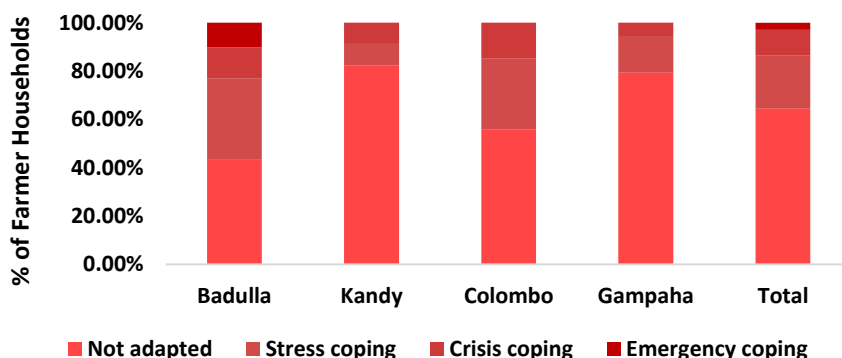
6.5 Livelihood based Coping Strategies

WFP (2021d) introduced an indicator named Livelihood Coping Strategies Index (LCSI) under the coping capacity domain of CARI console of food security. It is a tool that helps reveal how well households can handle not having enough food or money to buy food over a period of time and whether they can overcome difficulties in the future. The LCSI is estimated by revealing about how they have dealt with financial difficulties and loss of assets in order to manage food shortages.

6.5.1 LCSI Categories of Farmer Households

A significant portion of the farmer households is not employing coping strategies (64.5%). A smaller percentage (10.6%) of farmer households are equipped to handle crisis situations and an even smaller percentage (2.8%) is capable of handling emergency situations (Figure 6.7).

These findings reveal that a substantial number of farmer households may struggle with managing stress in their daily lives. This can lead to a range of negative consequences including decreased productivity, physical and mental health problems and difficulty in maintaining positive relationships. Further, findings highlight the need for developing effective coping strategies for managing stress, crisis, and emergency situations. It is essential to prioritize mental health and wellbeing to ensure that farmer households navigate the challenges they face with resilience and confidence.



Source: HARTI Survey Data, 2022

Figure 6.7: LCSI of Farmer Households by District

According to the findings of WFP and FAO (2022), approximately 23 percent of households are resorting to crisis or emergency livelihood-coping mechanisms that are expected to significantly affect their ability to generate income. This finding is largely similar to the study finding revealed as crisis coping strategies; 10.6 percent and emergency coping strategies; 2.8 percent. In essence, the goal of any food or cash assistance programme should be to reduce the reliance on livelihood strategies in general and ideally prevent the adaptation of crisis and emergency strategies.

6.5.2 Livelihood based Coping Strategies Employed by Farmer Households

There are several livelihood based coping strategies employed by households such as stress coping strategies, crisis coping strategies and emergency coping strategies. Table 6.3 presents them in detail for the study sample. These figures indicate that a considerable proportion of farmer households are encountering economic hardships in relation to acquiring food. Nearly 30 percent of those surveyed depleted their savings to buy food, while approximately one-tenth (11.4%) relied on credit to purchase both food and non-food products. Furthermore, around 15 percent of farmer households had to sell their household assets or goods, apparently for food purchases.

Similarly, WFP (2022) stated that people are turning more frequently to livelihood-based coping mechanisms such as obtaining loans or accruing debt in order to manage the challenges of insufficient food. Further, WFP (2022) found that 46 percent of respondents resorted to borrowing from banks, lenders or pawning goods, while 37 percent had to cut down their expenses on education and health. In addition, 38 percent of the respondents had to use their savings and or skip payments on debts to have food on their table.

Table 6.3: Livelihood based Coping Strategies Employed by Farmer Households by Severity

Severity	Strategy	Percentage of Farmer Households				Total
		Badulla	Kandy	Colombo	Gampaha	
Stress	Spent savings due to lack of food	47.3	17.6	38.2	17.6	30.8
	Purchased food/non-food on credit	18.4	5.9	14.7	5.9	11.4
	Sold household assets/goods	41	6	5.9	2.9	15
Crisis	Reduced expenses on health (including drugs) or education	7.9	8.8	14.7	2.9	8.6
	Sold productive assets or means of transport	12.8	2.9	0	2.9	4.9
Emergency	Mortgaged/Sold house or land	5.1	0	0	0	1.4
	Begged and/or scavenged	5.6	0	0	0	1.4

Note: The sum of the percentages of farmer households exceeds 100 due to multiple coping strategies employed by farmer households.

Source: HARTI Survey Data, 2022

CHAPTER SEVEN

Key Findings and Recommendations

7.1 Key Findings

1. Growers engaging in the floriculture sector have reduced the scale of operation in a considerable manner.
2. Certain plant micro nutrients, plant hormones and etc. that are not replaceable with organic substances or produced at home have prevent farmers from cultivating high value plant varieties. Hence, they have moved away from plant varieties that are highly depend on fertilizers and other agrochemicals. Eventually these plants have given lesser income to their households.
3. With high cost of commodities at present people are also struggling in meeting their daily needs. This situation has created a considerable reduction in demand for potted plants. However local demand for cut flowers and foliage is not much affected as weddings and other functions resume once the pandemic-related restrictions are lifted.
4. Organic pest and disease control mechanisms have failed to match the effect of agrochemicals. Alternative compounds as well as agrochemicals that have reached the market in unauthorized means are not also effective. However, farmers are unaware about various harmful effects of those products as there is no regulation by respective authorities.
5. Hydroponic cultivation as well as tissue culture plant propagation activities have also got affected due to unavailability of necessary fertilizer and other agrochemicals. Poly tunnels and net houses are not being maintained well and it incurs an additional cost when resuming usual practice.
6. As a result of reduction of scale of operation, moving to less valued plants and higher cost for inputs have contributed in slashing a considerable share of household income from all the value chain actors, mainly the growers. At the same time, this has led to unemployment (daily waged people worked at plant nurseries) which will eventually affect food security and social wellbeing of respective families.

7.2 Recommendations

To address the key issues faced by the stakeholders, it is essential to plan short term and long term coping strategies to revive the floriculture industry.

1. Networking new input supplier who produces alternative inputs such as organic fertilizer producers in the market with growers is essential as well as creating a mechanism to assure the quality of alternative inputs that are available in the market at present.
2. Programmes to create awareness as well to train farmers should be carried out in alternative ways of controlling pest and disease in floricultural items (cut flowers/foilage and potted plants) as well as how to maintain the nutrient status of soil and other potting material.
3. It is also useful to explore new foreign markets for flowers and foliage with less nutrient demand and requires less agrochemicals to manage pest and disease incidence to support households growing floricultural items and also to compensate for the foreign exchange earning loss in the sector.

REFERENCES

- EDB (Export Development Board) (2022). Colombo: Export Development Board.
- Food and Agriculture Organization (FAO) (1996). 1996 World Food Summit - Final Report. Available at: <https://www.fao.org/3/w3548e/w3548e00.html> [Accessed on 17 December 2022].
- food-security/reduced-coping-strategies-index [Accessed on 07 December 2022].
- food-security/reduced-coping-strategies-index [Accessed on 07 December 2022].
- Medical Research Institute (2022). Nutrition Status and Gaps in the Diet of Sri Lankans during the Pre-economic Crisis Period. Colombo: Medical Research Institute. Available at: http://www.mri.gov.lk/wp-content/uploads/2022/09/Diet-adequacy_Final-Report.pdf [Accessed on 23 April 2023].
- Padmini, S.M.P.C. (2016). Encouraging Floriculture to Reduce Poverty - Sri Lankan Experience. Available at: https://www.icid.org/wif2_full_papers/wif2_w.1.3.15.pdf [Accessed on: 10 June 2022].
- Piran-Qeydari, M. H., Heidarabadi, A., & Farzaneh, S. (2022). Investigating the effects of alienation and social networks on women's social health in 22 districts of Tehran. *Women's Studies Sociological and Psychological*.
- TAMAP (Technical Assistance to the Modernisation of Agricultural Programme in Sri Lanka) (2020). TAMAP Value Chain Analysis Study on Floriculture in Sri Lanka. Colombo: Ministry of Finance, Economic & Policy Development.
- TANGO International (2008). The Coping Strategies Index. Available at: https://documents.wfp.org/stellent/groups/public/documents/manual_guide_proced/wfp211058.pdf [Accessed on 10 December 2022].
- Tellis, W., 1997. Application of a case study methodology. *The qualitative report*, 3(3), pp.1-19.

- World Food Programme (2008). *Food Consumption Score*. Rome: World Food Programme Available at: <https://documents.wfp.org/stellent/groups/public/documents/ena/wfp196627.pdf> [Accessed on 07 December 2022].
- World Food Programme (WFP) (2022). Sri Lanka Food Security Monitoring. Available at: <https://reliefweb.int/report/sri-lanka/sri-lanka-remote-household-food-security-survey-brief-august-2022> [Accessed on 24 April 2023].
- World Food Programme (WFP) and Food and Agriculture Organization (FAO) (2022). *Hunger Hotspots. FAO-WFP early warnings on acute food insecurity*: Available at: <https://reliefweb.int/report/sri-lanka/sri-lanka-remote-household-food-security-survey-brief-august-2022> October 2022 to January 2023 Outlook. Rome. [Accessed on 24 April 2023].
- World Food Programme VAM Resource Centre (2021a). Food Consumption Score. Available at: <https://resources.vam.wfp.org/data-analysis/quantitative/food-security/food-consumption-score> [Accessed on 07 December 2022].
- World Food Programme VAM Resource Centre (2021b). Food Consumption Score. Available at: <https://resources.vam.wfp.org/data-analysis/quantitative/>
- World Food Programme VAM Resource Centre (2021c). Technical guidance for the Consolidated Approach for Reporting Indicators of Food Security (CARI). Available at: Technical guidance for the Consolidated Approach for Reporting Indicators of Food Security (CARI) - Data Analysis - WFP VAM Resource Centre [Accessed on 08 December 2022].
- World Food Programme VAM Resource Centre (2021d). Livelihood Coping Strategies-Food Security. Available at: <https://resources.vam.wfp.org/dataanalysis/quantitative/food-security/livelihood-coping-strategies-food-security> [Accessed on 08 December 2022].

Hector Kobbekaduwa Agrarian Research and Training Institute,
PO Box 1522,
Colombo,
Sri Lanka.

Tel. +94 11 2 6969 81
+94 11 2 6964 37

Fax. +94 11 2 6924 23

e-mail library@harti.lk

Web www.harti.gov.lk

ISBN: 978-624-5973-41-5



9 7 8 6 2 4 5 9 7 3 4 1 5

PRICE: LKR/-