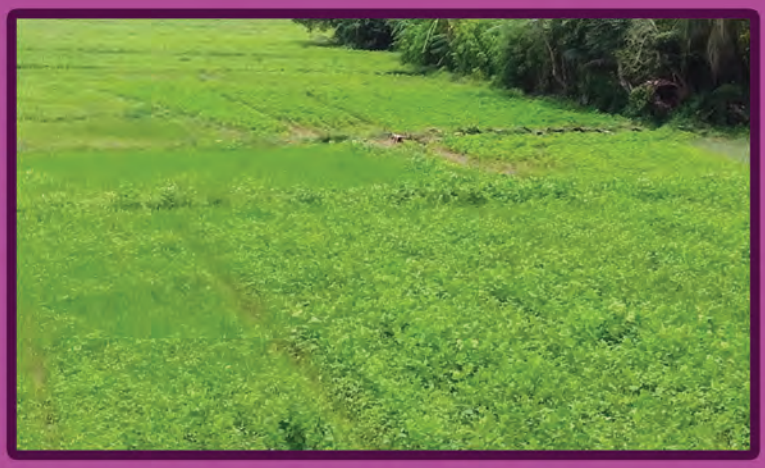
WORKING PAPER

OFCs IN THE INTERMEDIATE SEASON
Cultivation issues in selected districts

N.P..G. Samantha
E.A.C. Priyankara



HARTI
Hector Kobbekaduwa Agrarian Research and Training Institute

OFCs in the Intermediate Season

Cultivation issues in selected districts

N.P.G. Samantha
E.A.C. Priyankara

Working Paper No. 15 **October 2021**

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

First Published: October 2021

Final typesetting and lay-out by: Dilanthi Hewavitharana

ISBN: 978-624-5973-08-8

FOREWORD

Production of most of the Other Field Crops (OFCs) has declined substantially during the last decade letting forcing the gap between national production and requirement to be filled by imports. Cultivating OFCs in paddy lands during intermediate seasons has been identified as one of the strategies for increasing the production of OFCs by productively using limited resources of land and water. The process, however, has fallen short of expectations.

It is this context that the then Secretary, Ministry of Agriculture as the Chairman of the Board of Governors of HARTI, tasked the Institute to conduct a study to identify the barriers of mid-season OFC cultivation in the country with a view to recommending strategies for overcoming these and increasing the cultivation of OFCs. The objective of this study therefore was to identify the problems and constraints affecting the success of mid-season cultivation of OFCs in paddy lands. The technique of focus group discussion was employed to collect information from the Hambantota and Anuradhapura districts where mid-season cultivation has been taking place primarily.

The exercise revealed important socio-economic issues that hinder OFC production in the intermediate season at different stages of the production process and generated policy implications with respect to mitigating such issues.

I congratulate the research team for their invaluable efforts in conducting the study and hope these observations and recommended interventions will contribute in some way to delivering prosperity to everyone associated with this sector.

Malinda Seneviratne
Director/CEO

EXECUTIVE SUMMARY

Diversification of agricultural lands provides numerous advantages for farmers and the environment. The diverse agricultural system has a positive impact on the functioning of ecosystems, which in turn offers vibrant services for agriculture. Due to the advantages of crop diversification, successive Sri Lankan governments has been implementing proactive policies to expand Other Field Crop (OFC) cultivation in paddy lands as a remedy for ensuring water shortage for irrigation systems. However, many farmers have been reluctant to diversify their paddy lands in major seasons due to several constraints and cultural bonds. Hence, mid-season cultivation has been identified as a strategy to increase OFC production by the Department of Agriculture. Even though the country sets numerous targets to expand mid-season cultivation, the rate of progress has not been up to the expected levels. Therefore, the main objective of the present study was to identify the problems and constraints for mid-season cultivation of OFCs in paddy lands. The technique of Focus Group Discussion(FGD) was employed as the data collecting tool for the study. After having discussions with agriculture officers and subject matter specialists attached to Department of Agriculture, Anuradhapura, and Hambantota where mid-season cultivation has been taking place primarily were selected as study locations. Green gram is the main subsidiary crop growing in low lands in Hambantota and Anuradhapura Districts in the intermediate season. All the farmers participated in the Focus Group Discussions(FGDs) were of the view that the cultivating intermediate season has been economically, socially, and environmentally beneficial for them. Use of seeds that are in the market for consumption without any seed treatment for broadcasting, lack of quality seed, the high market price for seeds, and spread of seed diseases has been found as the seed-related issues in mid-season cultivation. Animal damages have been identified as the major bottleneck for mid-season cultivation, especially cattle damage in the Hambantota district. Price fluctuation, lower income due to pests and diseases, and lack of proper marketing mechanisms has also been surfaced as marketing issues. Furthermore, lack of experience and equipment for post-harvest management has also been mentioned to have restricted mid-season cultivation. Assurance of the availability of recommended seed at the beginning of the season has been expressed as a need to attract farmers to engage in mid-season cultivation. Hence the expansion of the certified seed production programmeto supply quality seeds is envisaged as a much needed solution for mid-season OFC cultivation. As proposed by the Focus Group (FG) participants, building a proper coordination among the relevant institutes functioning in the area is essential to mitigate cattle damages during the mid-season. Therefore, allocation of grasslands for cattle farming

is a much needed policy intervention to expand the mid-season cultivation in the Hambantota district. As revealed in the FGD strengthening post-harvest management practices by providing seed drying machines and cleaning machines at least one for a particular area can greatly enhance mid-season cultivation. Farmers request had been to provide cold storage facilities to store products in the peak harvesting period until the off-season to sell their products. The feasibility of providing cold storage facilities cost-effectively is a matter of concern for taking a firm decision in this regard. Improvement of value addition straight at the farm level was also perceived as a better solution for overcoming marketing constraints. It has also become evident of the need for a complete value chain analysis to identify the opportunities of developing the green gram industry for the benefit of all the participants along the value chain.

Contents

LIST OF TABLES

ABBREVIATIONS

AI	-	Agriculture Instructor
CBSL	-	Central Bank of Sri Lanka
FG	-	Focus Group
FGD	-	Focus Group Discussion
GDP	-	Gross Domestic Product
HARTI	-	Hector Kobbekaduwa Agrarian Research and Training Institute
OFC	-	Other Field Crop

1. INTRODUCTION

1.1 Background

The agricultural sector continues to play a major role in the Sri Lankan economy contributing 7% to the Gross Domestic Product (GDP) while being the primary employment source for 27.1% of the labour force (CBSL, 2020). Paddy, the most important and prioritized crop in the country, provides the staple food for the nation. Paddy cultivation extent is nearly 15% of the total land area of the country(Land Use Policy Planning Department, 2018). According to Paddy Statistics (2021), about708,000 hectares of the country's land has been cultivated with paddy, predominantly in the dry zone of the island. Paddy is cultivated during major seasons, *viz*. *Yala* and *Maha,* coinciding with the two monsoons, North-East and South-West. *Yala* season begins in May and continues until August while *Maha* season becomes effective during the period from September and March. Periods between the major seasons are called intermediate seasons or mid-seasons.

The cultivated extent of paddy in major seasons depends on the availability of water. Well-established irrigation structures allow farmers to cultivate paddy in both *Yala* and *Maha* seasons. However, in recent years, recurrent droughts have significantly reduced paddy cultivation in the *Yala* season (Burchfield & Gilligan, 2016). As a tradition, paddy cultivation occurs in almost all cultivable paddy lands during the *Maha* season with supplementary water stored in reservoirs when needed. In the *Yala* season, when the available water is inadequate, farmers opt to cultivate field crops (OFCs) that require less water than paddy.

Diversification of agricultural lands provides numerous advantages for farmers as well as the environment with positive impact on the functioning of ecosystems resulting vibrant services for the agriculture sector by mitigating agricultural losses due to pests and wildlife, enhancing soil health, enriching biodiversity, intensifying resilience to climate change, and reducing the climate-related risk for farmers. Furthermore, crop diversification positively affects household income and food security, absolute yield and yield stability, market accessibility of domestically produced crops and increasing the nutrition diversity of households, specifically by growing pulses for substantiating protein requirement of the farmers(Burchfielda & Poterie, 2018).

Due to the advantages of crop diversification, successive Sri Lankan governments implemented proactive policies to expand OFC cultivation in paddy lands as a remedy for addressing water shortage in irrigation systems.

However, many farmers have been reluctant to diversify their paddy lands in major seasons due to various restrictions and cultural bonds. Research conducted in rural Sri Lanka has identified several factors that limit farmer admittance to crop diversification, mainly due to the unsuitability of land for cultivating rice. Proper field characteristic is a basic condition for diversifying paddy lands into OFC. When this basic characteristic is present farmers opt for converting paddy lands into OFC, however, it is noteworthy that there exist other restrictions such as price, market stability, perishability, and lack of institutional support that come to the surface limiting the interest of farmers in crop diversification(Burchfielda & Poterie, 2018).

Food and nutrition security is a major concern in "2030 Agenda for Sustainable Development" which comprises 17 sustainable development goals and 169 targets to be achieved by 2030. The Sri Lankan Government assured to support 17 sustainable development goals to be completed by 2030 at the United Nations Sustainable Development Summit (2015) held in New York (WFP, 2017). The agricultural sector has the prime role to play in achieving the food and nutrition security of the country. In spite of Sri Lanka is being self-sufficient in paddy production at present, field crops, particularly pulses can contribute greatly to achieve food and nutrition security to attain protein requirements of the households. Traditionally, OFCs act as an indispensable food in the Sri Lankan diet as an additional source of food to supplement calorie and nutrition requirements for enhancing the health of the households, mainly among rural communities. OFCs therefore, are considered as a nutrition powerhouse that can contribute much to lessen malnutrition in the nation.

Identifying the importance of the OFC sector, successive governments since independence implemented different policy measures towards its development. Before implementing open economic policies in 1977the OFC sector played a major role in food and nutrition security due to restrictions on food imports as a consequence of inward-looking economic policies. For instance, during 1970-77, the OFC sector grew up rapidly with extensive government interventions, subsidizing agricultural inputs such as fertilizer and planting materials, state controlled marketing and the distribution system, and prices, and minimizing the risk of farmers by guaranteeing prices for rice and subsidiary crops. Local food production demarcated the per capita food availability due to import restrictions. Lack of competition resulting in the minimal intervention of the private sector distorted the market reducing the efficiency of limited resources. However, the lack of market availability of food crops affected people to cultivate their lands and thereby increased OFC production during the period. Policies achieving self-

sufficiency goals however, did not provide benefits for the majority of small farmers and consumers.

In 1977, Sri Lanka introduced a comprehensive package of economic reforms covering all the sectors of the economy along with trade liberalization. Massive development plans such as Accelerated *Mahaweli* Development Project and Integrated Rural Development Project (IRDP) have been implemented focusing on rapid development in the rural sector including agriculture. However, during the first six years of reforms (i.e. 1978-83) the non-plantation agriculture sector received less attention following a more liberalized policy on imports. Consequently, the sector was exposed to import competition, particularly food crops such as potatoes, onions, and chilli.

In 1984, government policies specifically focused on achieving self-sufficiency in pulses and increasing the production of chilli, potato, and onion. In the meantime, trade policies were implemented to safeguard consumers permitting imports when the domestic market fails to ensure food supplies in adverse situations (Bandara & Gunawardana, 1989; Athukorala & Jayasuriya, 1994; Lakshman, 1994; Gunawardana & Somaratne, 2000). Policies that affect the OFC sector during the period of the second wave of liberalization (i.e. 1989-93) included the removal of fertilizer subsidy with effect from 01 January 1990 allowing market forces to determine fertilizer prices. Crop diversification and export performance of the non-plantation sector were also major focusing areas during 1989-93 (Gunawardana & Somaratne, 2000). The need of expanding the OFC sector was also emphasized in national policy initiations. The national policy framework outlined by the Ministry of Agriculture, Land, and Forestry in 1995, highlighted the need of expanding the OFC sector by providing high-quality seed and planting materials, consolidating extension services, and developing public-private partnerships(Hathurusinghe, Rambukwella, Vidanapathirana, & Somaratne, 2012). *Mahinda Chintana*, the government manifesto outlining the nation's “vision for the future” stated that the government shall give high priority for further expansion of crops such as onion, chili, cowpea, maize, green gram, finger millet, and other subsidiary food crops which can be grown locally to achieve self-sufficiency. The government has provided funding for research and extension for promoting OFC cultivation and has launched an “Accelerated Other Field Crop Production Programme” with the objectives of increasing agricultural production, meeting local demand for OFCs, and increasing domestic food security (Burchfielda & Poterie, 2018).Introduction of a compulsory insurance scheme for paddy, soya, potato, maize, big onion, and chilies in 2018 was a remarkable policy measure to encourage farmers `for cultivation

of OFCs. Promotion of Good Agricultural Practices and popularization of certified seeds and drip irrigation among the stakeholders are some of the steps taken by the government to increase production of OFCs such as maize, big onion, green gram, and cowpea are noteworthy initiatives during the period from 2015to2019 (CBSL, 2019).The national policy framework outlined by the present government, "Vistas of Prosperity and Splendor" has also given priority for cultivation and promotion of OFCs such as dried chilies, maize, soya, green gram, cowpea, onions, and potatoes. Aligned with this policy, the government declared floor prices for 14 selected OFCs and banned the importation of OFCs that can be produced locally to encourage farmers (Government of Sri Lanka, 2020).

Despite these efforts and attention OFC cultivation rates remained low even for the crops that have great potential to achieve self-sufficiency. Over the past two decades, the cultivated extent as well as the production of most of the OFCs, especially pulses, has decreased drastically creating a gap between local production and the annual requirement (Department of Census and Statistics, 2020). For instance, cultivated extent and production of OFCs, green gram and cowpea, have decreased drastically from 1990 compelling importation to fill the gap between the production and national requirement. In 2018, imported green grams amounted to nearly 60% of the national requirement. Most of the OFCs followed the same trend creating an extra burden on the national budget.

In concurrence with promotion of mid-season cultivation as a strategy to increase OFC production by the Department of Agriculture, "The Food Production National Programme 2016-18" launched by the Presidential Task Force on National Food Production, initiated activities to expand third season cultivation of green gram, cowpea, and black gram to achieve self-sufficiency (Food Production National Programme 2016-2018, 2015). Under "National food production drive" a project was initiated to promote third and fourth season cultivation of green gram and cowpea by providing seed for cultivation and supplying registered seed to produce certified seed at 50% farmer contribution along with extension services and farmer training. This project was implemented in Monaragala, Matale, Anuradhapura, Kilinochchi, Mullativ, Vavunia, Ampara, Polonnaruwa, Trincomalee, Ratnapura, Kurunegala, Puttalam, Kandy, Mannar, Jaffna districts, and Mahaweli areas covering provincial, interprovincial and *Mahaveli* specific areas(Department of Agriculture, 2018). Even though the research findings by Jayewardene & Jayasinghe (1992) demonstrated that the mid-season or intermediate season cultivation has enormous benefits to farmers in terms of farmer enthusiasm, farmer income, and agricultural production potential capabilities, the progress of mid-season cultivation has not achieved the

success at the expected rate. In view of this scenario this study was conducted to identify the issues hindering mid-season cultivation of OFCs in paddy lands.

1.2 Problem

Diversification of paddy lands during mid-seasons brings more benefits to country's agricultural sector. It increases farmer income and livelihood of farmer-families while ensuring the food security of the nation by guaranteeing the availability of locally produced food, especially pulses. Further, crop diversification smoothens the function of the ecosystem (Burchfielda & Poterie, 2018). Mid-season cultivation is vital for a country like Sri Lanka, which highly depends on food imports.

Even though the country sets numerous targets to expand mid-season cultivation, the rate of progress has not been up to the expectations. The national food production programme 2016-18 highlighted the need of expanding third season cultivation of green gram, cowpea, and black gram to achieve self-sufficiency by 2018. The annual requirement of green gram was 26,000 Mt as of 2015 and out of that only 12,000 Mt has been produced locally. The same programme targeted to produce 14,000 Mt of green gram in the third season by cultivating an extent of 5,515 ha in the provincial and 8,540 ha in the inter-province areas(Food Production National Programme 2016-2018, 2015) but only extents achieved in 2016, 2017, and 2018 were 11,302 ha, 7,371 ha, and 8,615 ha respectively. The country has produced only 16,425 Mt of green gram in 2018 which is only 38% of the national requirement(Department of Census and Statistics, 2020).

The available data shows that there is a gap between policy targets and the ground-level situation of the third season cultivation. Despite there is research evidence that mid-season cultivation can bring benefits for farmer-families in terms of income and food security farmer participation remains at a lower rate. The reasons for this scenario unresolved this study was conducted specifically to fill this information gap.

1.3 Objective

The main objective of the study was to identify the problems and constraints affecting the success of mid-season cultivation of OFCs in paddy lands.

1.4 Structure of the report

The report is presented in four sections *viz.* Introduction, Method, Results and Discussion and Concluding Remarks.

2. METHOD

The technique of Focus Group Discussion (FG)was used as the data collecting tool of the study. FG technique is advantageous for this kind of study because it is a qualitative research technique that focuses on a specific issue with a predetermined group of people, participating in an interactive discussion. According Henink (2014) FG technique is an interactive discussion carried out by six to eight selected participants, led by a trained moderator focusing on a specific set of issues. It aims to gain a broad range of views on the research topic over a 60-90 minute period and to create an environment where participants feel comfortable to express their views. Since the prime objective of the study was to identify the problems and constraints in cultivating OFC in mid-season FG is the most appropriate data collecting tool in order to understand the magnitude of the issue from the viewpoint of the participants themselves, while gathering different views on the issue accurately and rapidly in one setting.

In consultation with agriculture officers and subject matter specialists of the Department of Agriculture, Anuradhapura, and Hambantota were selected as the most appropriate locations for the study since mid-season cultivation is mostly takes place in these two districts. According to primary information of the Department of Agriculture, Hambantota is the most prominent district where OFCs, especially pulses has been cultivated in paddy lands in the intermediate season during the last decade. Since FGD is a carefully planned data collection procedure designed for obtaining participants' perceptions in a well-defined area of interest in a non-threatening environment, participants were purposively selected with common characteristics related to the objective of the study. According to Hui Shung and Lydia, (2005) in this selection process and the sample size, the focus groups do not constitute a random sample and not intended to be representative of the general population as the results will not be suitable for making inferences or predictions. Based on this argument, ten FGDs were conducted in five locations in the Hambantota district *viz.* Lunama, Ambalantota, Weerawila, Yodakandiya, and Bandagiriya with participants from purposively selected two locations. In the similar manner four FGDs were conducted in the left and right bank areas of the Rajanganaya scheme that comes under the purview of inter-provincial extension setup of the central government and two more FGDs in the areas under the Mahaweli Extension Service of the Rajanganaya Scheme in the Anuradhapura district. Altogether 16 FGDs were held to collect information from the participants in the two districts. The number of participants in each FG varied from 7 to 13, selected with the help of Agriculture Instructors (AI) in each location.

Since the group setting was more important in FGDs selection of participants were closely monitored to ensure accurate results.

FGDs were conducted in common locations where all the participants have easy access. Discussions were audiotaped with the consent of participants. In addition, notes were taken by trained enumerators. A moderator and a co-moderator facilitated the group discussions each lasting about an hour. A semi-structured questionnaire was developed by the research team as a guide for FGDs to ensure the consistency of questions asked across groups allowing a certain margin of enquiring flexibility. All the participants were given equal opportunity to present their views on the research topics enabling them to highlight the issues of importance to them. After completing the discussions, all the participants were interviewed separately using a pre-prepared questionnaire to collect basic information as age, marital status, level of education etc.

The data gathered were analyzed by following the thematic analysis approach to investigate each issue in-depth to verify relationships between various issues identified since this approach was presumed to be more suitable to identify the magnitude of the issues in mid-season cultivation of OFC in paddy lands from the perspective of the farmers. Transcripts of audiotapes and summary of notes were included in the analysis.

3. RESULTS AND DISCUSSION

3.1 Socio-economic Characteristics of the Focus Group Participants

Socio-economic characteristics of FG participants are summarized in Table 3.1. In the sample of 150 FG participants 66% were over 50 years of age and 84% were males. The status of education of FG participants was categorized into seven from non-formal education up to postgraduate level and among them interestingly nearly 50% have completed more than ten years of formal education. As projected, farming is the main source of income of all households participated in FGDs. Over 50% of FG participants had over five years of experience in mid-season OFC cultivation. This is noteworthy because the study intends to identify problems and constraints faced by farmers cultivating during the intermediate season.

Table 3-1: Socio-demographic Information of FG Participants.

Gender	**Number**	**Percentage**
Male	126	84
Female	24	16
Total	**150**	**100**
Marital status		
Single	7	4.7
Married	143	95.3
Total	150	100
Level of education		
No formal education	10	6.7
Primary Education	44	29.3
Studied up to Grade 8	23	15.3
Studied up to GCE (O/L)	50	33.3
Studied up to GCE (A/L)	21	14.0
Holding Diploma	1	0.7
Having postgraduate qualifications	1	0.7
Total	**150**	**100**
Age group		
20-29	4	2.7
30-39	17	11.3
40-49	29	19.3
50-59	38	25.3
60=<	62	41.3
Primary household income source		
Farming	136	91
Government employment	2	1
Private sector employment	3	2
Self-employment	9	6
Years of experience in mid-season OFC cultivation		
Less than 1 year	45	30
2-4	28	18.7
5-9	40	26.7
10-15	24	16
More than 15 years	13	8.7

Source: Author's calculation, 2020.

3.2 Mid-season OFC Cultivation in Hambantota and Anuradhapura Districts

Yala and *Maha* are the main cultivation seasons of Sri Lanka categorized upon rainfall and climatic conditions enabling paddy cultivation in the country. The periods between these main seasons are called intermediate or mid-seasons. The cropping calendar published by the Department of Agriculture of Sri Lanka defines two intermediate seasons between *Yala* and *Maha* seasons. Usually, most farmers prefer mid-season/s for taking a break. Some farmers take this intermission during the period at end of *Yala* or/and *Maha* season/s. A mid-season usually spans around 60 days. Green gram (mung bean *Vignaradiata*) is the main subsidiary crop grown in low lands in the Hambantota area during intermediate seasons.

OFC cultivation in the Anuradhapura district also takes place in the mid-season after *Yala* harvesting. Similar to Hambantota, here too green gram is the most grown OFC in low lands during the mid-season. Farmer participation in cultivating OFCs in the intermediate season is relatively low in the Anuradhapura when compared to the Hambantota. According to farmers' experience and time constraints green gram is the most suitable crop for mid-season cultivation in both districts.

All the farmers participated in FGDs viewed that cultivating OFCs in the intermediate season is beneficial economically, socially and environmentally, because they get an additional income by productively spending the lagging period between the main cultivating seasons. This also generates employment opportunities for labour especially for women in the area while improving the physical, chemical, and biological structure of the soil as a result of cultivating green gram which serves as a source of adding nutrients for the succeeding cultivating season. According to majority of farmers, higher yield and greenish fields can be gained without applying fertilizers in the subsequent season. According to FGD participants' less effort is needed for basic agronomic practices such as land preparation, watering, fertilizing, and pesticide application for green gram cultivation than other OFCs.

Farmers' practice several techniques for green gram cultivation in the intermediate season;

1. Sowing seeds before paddy harvesting allowing them to get tightly attached to the soil by using the combine harvester.
2. Stubble method; sowing immediately after paddy harvesting without any land preparation allowing the remaining stubble to serve as a moisture shielding layer.

3. Sowing Green gram after burning the paddy straw and turning the soil.

Methods one and two are the most common practices in the third season green gram cultivation in paddy lands. Watering is carried out once before sowing green gram unless severe drought conditions occur in these cultivation techniques. Highlands with good drainage are high, moderate, and low are more suitable for green gram cultivation.

According to the participants, in green gram more than half of the total cultivation cost expends on harvesting. Even though land preparation, seed broadcasting and fertilizing is not an issue in green gram cultivation labour scarcity heavily constrains as finding workers for harvesting is difficult. Lack of labour and high cost of labour was highlighted by majority of farmers participated in the FGDs in both Hambantota and Anuradhapura districts as a major constraint disrupting mid-season green gram cultivation.

There are three ways of obtaining labour for green gram harvesting.

1. Based on daily wages: Hiring female and male labour at an average rate of Rs. 700 - 1200.00 per day.
2. Based on daily harvesting: In this system labour is paid on the output per day. The shortcoming of this method is the quality of the harvest because the pluckers mainly target quantity rather than the quality making the presence of low-quality, immature beans in the harvest is inevitable.
3. Based on sharing the harvest: Labour can also be hired on the basis of equally sharing the harvest between landowner and the harvester. The advantage of this system is the quality concern of the harvesters because half of the production goes to them. Farmers prefer this method because the owner has to process, store and market only half of their harvest in so saving time, labour, and cost.

Generally, harvesting is carried out thrice within a season. The portion of the harvest is uneven in each occasion.

According to majority of farmers, green gram harvesting process needs to be mechanized and they should be provided with newly developed machines and techniques for harvesting. Some farmers use combine harvester used in paddy harvesting for green gram harvesting despite the lessening of the quality of the seed (harvest) due to seeds and leaves touching together within the machine causing discolouration of the seed coat, which ultimately effects adversely on the price of the final product. Some farmers use salt solution (500g/tank) as a remedy to die-attach the

leaves before harvesting. But this reduces the luster of the seed coat. However, the need to mechanize green gram harvesting process remains as an essential necessity for sustaining the mid-season green gram cultivation. It became evident from the study that the labour employing system, grand scheme (*AththamKramaya*), traditionally practiced in paddy harvesting is not practiced by green gram cultivators.

Water requirement for green gram in the mid-season is indistinct when compared to paddy. In green cultivation water requirement before cultivation is generally fulfilled from irrigated water. In most areas irrigated water is supplied only once in the crop life cycle during the mid-season. On the whole, water requirement and related problems are quite low for green gram cultivation. In some cases, in minor irrigation schemes, water supply becomes an issue for mid-season cultivation where there are illegal settlements in the catchment areas of reservoirs (acre land). Farmers propose introducing a 50% subsidy programme for constructing tube wells for those engaged in mid-season cultivation in such areas.

Normally, need for applying fertilizer and chemicals is unimportant for green gram cultivation in the mid-season. The fertilizer applied for paddy cultivation in the preceding season is sufficient to substantiate the fertilizer necessities for green gram cultivation. Therefore, additional fertilizer application is not essential for green gram cultivation despite application of liquid fertilizer/s during the flowering stage. With regard to pests damaging green gram farmers apply insecticides to curb the pest known as *kudiththa.* They also use kerosene as a conventional method to reduce caterpillar damages. Insecticides commonly used against pests affecting green gram are readily available in the market though not assured of their quality. According to participants, green gram farmers in the mid-season normally spend about Rs. 5000.00 per acre on chemical applications. A disease known as yellow disease, particularly in the Australian type has also been found in mid-season green gram cultivations for which a remedy has not been found to date.

The climatic condition is extremely important for proper cultivation of green gram. Green gram cultivations get adversely affected when adverse weather alternations occur in the mid-season. For instance, high precipitation retards plant growth and sometimes decaying the whole plant. The government has been providing compensation for green gram farmers at times for damages that occur due to natural hazards at the rate of Rs. 2500.00per acre.

Focus Group Participants are of the view that there should be an insurance system to retain mid-season OFC farmers due to various risks they encounter especially due to natural disasters. Otherwise there is a high likelihood of farmers abstaining from mid-season cultivation apart from those who could afford to continue by overcoming sporadic catastrophic situations.

Sandy soil is more suitable for green gram cultivation but majority of farmers do not test the suitability of soil in their lands before deciding whether to invest or not on mid-season cultivation of OFC's. Mid-season cultivation of OFCs are usually planned a year before the season by organizing "seasonal meetings" (*kanna meetings*) with the involvement of extension officers and other related officers proficient in providing technical know-how on areas such as water supply, fertilizer application, and pesticide application and any other supportive matters affecting mid-season cultivators.

Despite afore mentioned constraints faced by mid-season OFC cultivators it is encouraging to note that majority of farmers engaged in green gram cultivation in the intermediate season affirm that mid-season cultivation of green gram is highly beneficial for them in all desired aspects; economic, social, and environmental.

3.3 Problems and Constraints of Mid-season Cultivation

In keeping with the objective of the study, this section is devoted to analyze the nature and the magnitude of the problems and constraints associated with mid-season cultivation of OFCs with special reference to cultivation of green gram in low lands.

3.3.1 Seed Related Issues

Seed is one of the most important inputs for any kind of crop in terms of agricultural productivity. Lack of good quality seedsof OFCs was highlighted as a major issue at FGDs held in Hambantota and Anuradhapura districts. Green gram is the main crop cultivated in low lands of Hambantota and Anuradhapura during the intermediate season. MI 5 and MI6 are the green gram varieties recommended by the Department of Agriculture. The price of seeds of these varieties varied from Rs.280.00/kg to Rs.330.00/kg during the previous cultivation season (2019). Farmers complained that they were not able to obtain sufficient quantities of these recommended seeds at the time of cultivation. As a result, they were compelled to purchase green gram seeds imported from Australia even though they are not recommended by

any authority responsible for seed certification in the country. The green gram variety MI 6 was not much popular among the farmers due to the small size of the harvested seed as compared to MI 5 and fading of the colour after few days of harvesting. Farmers in all the areas where FGDs were conducted mentioned that they prefer cultivating imported green gram seeds because large size and brightness of the harvested seeds when compared with recommended local varieties.

Problems related to seeds in other field crops (OFCs)

1. Farmers engaged in cultivation of OFCs use seeds that are in the market for consumption as seeds for cultivating in the mid-season even without any seed treatment before broadcasting. Presumably quality of these seeds is low, nature of their produce is unknown, and their performance is unpredictable since they are not produced from authentic seed parents.
2. Farmers engaged in cultivation of OFCs in some areas have to travel long distances sparing their time and spending excess money to purchase certified seeds. For instance, those in Hambantota will have to travel to *Bata Ata* farm (30 km away) for purchasing seeds. Even seeds of imported from Australia were not available in those areas.
3. Exorbitant market price of recommended seeds.
4. Removal of the 50% subsidy for seeds.
5. Spread of seed-borne diseases (e.g. Yellow disease)

Suggestions of farmers identified for FCDs

1. Provide quality assured seeds with proper standards or even those imported (e.g. Australian variety).
2. Promote seed treatment before broadcasting to reduce mite damage. Since farmers have to spend Rs. 2000.00 per acre for seed treatment it is important to persuade them to follow this practice by conducting proper extension programmes.
3. Re-introduce the 50% percent subsidy scheme for seeds.
4. Introduce and promote new seed varieties which can tolerate diseases and withstand adverse climatic conditions.
5. Guarantee a reasonable price for seeds recommended for cultivation (broadcasting).
6. Ensure adequate supply of seeds with certification of the Department of Agriculture for broadcasting purpose and make readily available in the market for easy purchase.

Availability of quality seed at right time is a prime requirement for mid-season cultivation of OFCs in paddy lands. Due to unavailability of quality seeds in the open market or any other place where farmers can access, some farmers have to give up cultivation even if they have the desire for cultivating OFCs in mid-seasons. Providing seed with a 50% subsidy is a worthwhile promotional strategy of the Department of Agriculture in the past which should be considered to bring into effect again since farmers presume it as a continuous support because of the difficulty of finding quality seed at the right time. Assurance of the availability of recommended seeds at the beginning of the season is a basic need to attract and retain farmers to prosper mid-season cultivation of OFCs. Therefore, expansion of the certified seed production programme in unison with mid-season OFC cultivation should be considered is a beneficial remedy to alleviate the deficiency of quality seeds. Due to the lack of certified recommended seeds, most of the farmers depend on imported seeds without any accepted accreditation. Getting even non- recommended imported seeds is also grim at present due to restrictions on imports. Hence, relevant authorities should give high priority to address these issues to ensure promoting OFC cultivation during the mid-season.

3.3.2 Animal Damages

Animal damage is a serious problem that warrants a discussion in this section. It has become evident from FGDs that animals *viz*. monkeys, peacocks, parrots, elephants, cows, and buffaloes cause considerable damage to OFCs cultivated in mid-seasons. This is more severe in the Hambantota district than in the Anuradhapura district. Damage caused by cows and buffaloes is a major threat in the intermediate season, especially in the Hambantota district. Usually, lands adjacent to forest areas and those nearby are not cultivated in the intermediate season due to damage from by peacocks and monkeys since mending electric fences cannot avoid such invaders. Especially, peacocks consume flowers and seeds of green gram plants throughout the day.

Cattle damage is a major limiting factor for cultivating OFCs in the intermediate season especially in the Hambantota district. Releasing cattle to the stubble preceding the paddy harvesting is practiced as a habit by the cattle owners with the onset of the intermediate season. According to most of the FGD participants, “dairy farmers believe that the stubble is their property and hence they fight to get the right of the so-called property”. This has been the most highlighted topic surfaced in FGDs with regard to animal damage during mid-season cultivation of OFCs with respect to cattle damage. Government has taken steps to tackle this issue by providing

electric fences with solar panels in selected areas. Yet dairy farmers forcefully damage these barriers and release cattle to these areas. According FGD participants, there are some shortcomings in the legal system for enforcement of such regulations. For instance, although the farmers receive compensation (Rs.5000) for damages made by free rearing cattle, the farmers have to bear the responsibilities of fulfilling the requirements of the encroached cattle under his guardian. Existing rules have also not been regularly operated due to personal matters and legal assistance received by the dairy farmers. According to the farmers' opinion, dairy farmers are more powerful than paddy farmers. Dairy farmers in these areas do not reveal the exact number of their cattle to avoid denial of welfare benefits they enjoy such as *Samurdhi*. Since an accurate estimation has not been taken place of cattle dwelling in these areas to date the problem continues when allocating grasslands for cattle due to underestimation of the real cattle population.

The solutions suggested by the farmers to address the issues of animal damage are:

1. Establish better coordination among the government institutes of the Agrarian Service Center, Irrigation Department, Administrative institutes (*GramaNiladari*, Divisional Secretariat, and District Secretariat etc.), Irrigation Management, and Police to enforce the established regulations. In addition, it is important to get the participation of responsible parties such as police for seasonal meetings (Kanna Resweema) for taking appropriate decisions to avoid and prevent problems of farmers engaged in cultivation of OFCs.
2. Allocate and ensure proper maintaining suitable lands for cattle as grasslands.
3. Enforce existing laws and regulation fairly without prejudices.
4. Establish appropriate compensation for crop damages caused by animals.

The rest periods (mid-seasons) of paddy lands between the major seasons have been traditionally left for cattle feeding in the investigated areas without any restrictions. Cultivating the third season becomes a restriction for cattle farming, especially for free grazing cattle in the Hambantota district. Therefore, it is important to establish a balanced status where parties, mid-season cultivators and cattle farmers can get mutual benefits. Mid-season cultivation can also create social issues unless it is managed properly. There are instances reported that cattle owners in the Hambantota district as a group rejected selling curd for office bearers of the farmer societies even for special household requirements as a protest

against mid-season cultivation. Hence, this situation needs to be managed very carefully with proper coordination among relevant institutes functioning in the area as proposed by the FG participants. Allocation of grasslands for cattle farming therefore needs a well-established policy framework to expand the mid-season cultivation in the Hambantota district.

3.3.3 Marketing

Marketing green gram produced in mid-seasons was highlighted as a major issue by the FG participants in Hambantota and Anuradhapura districts. The low market price at the peak harvesting period was raised as a burning issue by the participants in both districts claiming that sometimes they are even unable to recover the harvesting cost. However, the price of the harvested seed depends on the quality of the product. The appearance and the size of green gram produced by cultivating local seeds are not much attractive as those obtained by cultivating imported green gram seeds. Hence, low consumer preference pushes the market price down of the locally produced green gram in the open market. The situation is worst in produces harvested in second and third times. The produces with mixed discoloured and different-sized seeds always receive a low market price in the open market. The preparation of the product for getting a market demand is vital in gaining a better price. Even though the farmers are aware of this, they do not practice proper processing procedures due to inadequate technological know-how and lack of suitable machinery.

The government has been giving less priority for marketing of OFCs in the country as such given for paddy during the peak harvesting period. Dearth of buyers also negatively affects market prices. Normally, farmers sell the production to private grain collectors functioning within the area or those in nearby towns. Due to fewer options, farmers have to depend on few buyers and accept whatever the price offered by the buyers. Only a few private sector institutes buy OFC products on forward sales agreements, however, farmers' claim that is also not properly functioning.

Setting a floor price and increasing import tax during the harvesting time were the suggestions forwarded by participants in FGDs as a remedy for getting them a good price for their products in the open market. However, FGDs were conducted before the recent policy initiatives restricting importation of subsidiary food crops that can be produced locally. Hence, it is likely that afore mentioned marketing issues raised by OFC farmers may not exist by now.

3.3.4 Post-harvest Management

Proper post-harvest management practices are vital for getting quality products catering to market demand. Separating seed from the raw pod is the foremost post-harvest activity of green gram. According to farmers' experience, 1 kg of seed can be obtained from 3 kg of raw pods from the Australian green gram variety. However, 5kg of raw pods are required to get 1kg of seed from locally recommended green gram varieties. Almost all the farmers' use conventional techniques to separate seeds from the pod which tends to reduce quality of the end product. Lack of technical know-how and strategies to achieve expected standards has been found as a noticeable issue in green gram post-harvest management. Due to unavailability of machines to separate inactive and discoloured seeds from the final product reduces the quality as well as attractiveness of the product in the market by losing seed uniformity in size and colour. The shelf-life of seeds is dropping after separating green gram from the pods and the weevil damages are also becoming prominent. Hence proper storage facilities are required to overcome this problem. According to farmers' experience, green gram seeds cannot be kept under normal storing conditions for a considerable period after processing. However, these seeds can be stored for 2 or 3 months without further processing (dried pods)". Hence, lack of proper storage facilities was the most a serious problem at the farm level.

Post-harvest management practices can be improved by providing seed drying machines and cleaning machines at least one each for a particular area. Farmers also requested facilities for cold storage to store their products during the peak harvesting period and to sell them in the off-season. However, viability of providing cold storage facilities for green gram and cost-effectiveness for such needs to be firmly assessed before arriving at a decision. Value addition to green gram at the farm level is also presumed as a possibility for addressing green gram marketing issues.

Issues related to OFC cultivation in the mid-season has been discussed in detail in this section. Green gram is the main subsidiary crop cultivated in the mid-season in Hambantota and Anuradhapura districts. All the FG participants were of the view that mid-season cultivation has been an opportunity for increasing their income by using paddy lands and family labour during the rest period between major seasons. This increases the cropping intensity of paddy lands as well as the family income of paddy farmers. Farmers in the Hambantota district have more experience in mid-season cultivation than farmers in the Anuradhapura district. Low income due to pests, diseases, and natural hazards, lack of quality seed, animal

damages has been the constraints expressed by farmers especially in the Hambantota district. Lack of proper marketing solutions and post-harvest management practices has also been surfaced as major bottlenecks for mid-season cultivation of green gram. Farmers' views and suggestions to overcome their problems related to mid-season cultivation of green gram were also discussed lengthily in this section. Having considered the outcome of the FGDs the authors felt that there is a need for conducting a complete value chain analysis to identify the opportunities to expand the green gram industry in the rural where paddy is extensively cultivated to get benefits for all participants along the mid-season OFC cultivation process.

4. CONCLUDING REMARKS

OFC cultivation during mid-seasons in paddy lands is considered as a far reaching solution to increase the production of subsidiary crops by intensifying the cropping intensity of paddy lands. All the farmers who participated in the FGDs conveyed that cultivating intermediate season is beneficial economically, socially, and environmentally to households in addition to generating employment opportunities for hired labourers (especially for women) in the area. Mid-season cultivation also enhances physical, chemical, and biological properties of soil when cultivated with green grams as it acts as a nutrient source for the preceding cultivating season. During the FGDs number of issues related to seeds used for cultivating green gram was surfaced. Planting seeds that have been in the market for consumption without any seed treatment for broadcasting, lack of quality seed, the high market price for seeds, and spread of seed diseases (e.g. Yellow disease) were the most prominent restraints raised by the farmers as seed-related issues in mid-season cultivation of green gram. Animal damage was another problem encountered by farmers engaged in cultivation of green gram in mid-seasons, cattle damage being the most destructive in the Hambantota district. Several other noteworthy constraints encountered by green gram cultivators in mid-seasons are price fluctuation, lower-income due to pests and diseases, absence of proper marketing mechanisms, lack of equipment and experience for post-harvest management.

Assuring the availability of recommended seeds at the beginning of the season is an utmost necessity to encourage and retain farmers for mid-season cultivation of OFCs. Hence expansion of the certified seed production programme alongside with mid-season OFC cultivation is essential to provoke a workable solution for the scarcity of high quality seed. Otherwise farmers will have to depend on imported seeds which are not recommended by any seed certifying authority for planting during the intermediate season. Getting even such non- recommended imported seed would also become more difficult in situations when imports are getting restricted. Hence, special attention should necessarily be directed to address the issue of providing quality seed at the right time for off season green gram cultivation. With respect to crop loss due to animal damage it is essential to establish a suitable mechanism for proper coordination among the institutes functioning in the area as proposed by the FG participants especially to mitigate cattle damages during the mid-season. Fair allocation of grasslands for cattle farming is also a vital policy initiative to expand the mid-season cultivation in the Hambantota district. Post-harvest management is crucial for storing marketing OFCs, especially green

gram cultivated in the mid-season. Post-harvest management practices can be improved by state intervention by providing seed drying machines and cleaning machines at least one per OFC cultivated area. Even though farmers requested cold storage facilities to store products at the peak harvesting period and sell them in the off-season it is necessary to assess viability of providing cold storage facilities in terms of cost-effectiveness before reaching a decision. Value addition to OFC harvests is also worthwhile to consider even at the farm level as an option of addressing marketing issues. Considering the overall outcome of FGD's with regard to green gram cultivation during the intermediate season, conducting a complete value chain analysis is recommendable for identifying the opportunities of the green gram industry to get benefits for all participants along the value chain.

REFERENCES

Athukorala, P., &Jayasuriya, S. (1994). *Macroeconomic Policies, Crises and Growth in Sri Lanka, 1969-90.* Washington, D.C.: TheWorld Bank.

Bandara, J., & Gunawardana, P. (1989). *Trade Policy Regimes and Structural Changes: The Case of Sri Lanka.* Victoria, Australia.: Discussion Paper No. 6/89, School of Economics, la Trobe University, Bundoora.

Burchfield, E. K., & Gilligan, J. (2016). Agricultural adaptation to drought in the Sri Lankan dry zone. *Applied Geography, 77*, 92-100. doi:https://doi.org/10.1016/j.apgeog.2016.10.003

Burchfielda, E. K., & Poterie, A. T. (2018). Determinants of crop diversification in rice-dominated Sri Lanka. *Journal of Rural Studies, 61*, 206-215. doi:https://doi.org/10.1016/j.jrurstud.2018.05.010

CBSL. (2019). *Annual Report.* Colombo: Central Bank of Sri Lanka.

CBSL. (2020). *Annual Report 2020.* Colombo: Central Bank of Sri Lanka.

Department of Agriculture. (2018). Retrieved from http://www.agrimin.gov.lk/web/images/Projects_of_the_DOA.pdf

Department of Census and Statistics. (2020). Retrieved from Agriculture Statistics: http://www.statistics.gov.lk/Agriculture/StaticalInformation/HighlandCrops

Food Production National Programmeme 2016-2018.(2015). Presidential Task Force on National Food Production, Colombo, Sri Lanka.

Government of Sri Lanka. (2020). Retrieved from National Policy Framework Vistas of Prosperity and Splendour: http://oldportal.treasury.gov.lk/documents/10181/791429/FinalDovVer02

Gunawardana, P., & Somaratne, W. (2000). Non-Plantation Agricultural Economy of. *Sri Lankan Journal of Agricultural Economics, 3*(1), 15-45.

Hathurusinghe, C., Rambukwella, R., Vidanapathirana, R., & Somaratne, T. (2012). *Production and Marketing of Other Field Crops: A Review.* Colombo: Hector Kobbekaduwa Agrarian Research and Training Institute.

Henink, M. M. (2014). *Focus Group Discussion.* Oxford University Press.

HuiShung, C., & Lydia, Z. (2005). Consumer perceptions and demand for organic food in Australia: Focus group discussions. *Renewable Agriculture and Food Systems, 20*(3), 155-167. Retrieved from http://journals.cambridge.org/abstract_S1742170505000189

Jayewardene, J., & Jayasinghe, A. (1992). Management Arrangements for Diversifying Rice Irrigation Systems in Sri Lanka. *Management Arrangements for Accommodating Nonrice Crops in Rice-Based*

Irrigation Systems (pp. 97-115). Quezon, Philippines: International Irrigation Management Institute.

Lakshman, W. D. (1994). Structural Adjustment Policies in Sri Lanka: Imbalances, Structural Disarticulation and Sustainability. *Paper Presented to the International Conference on Economic Liberalisation of South Asia.* Canberra.: Australian National University.

Land Use Policy Planning Department. (2018). Retrieved from http://www.luppd.gov.lk/images/page4.pdf

Paddy Statistics. (2021). Retrieved from Department of Census and Statistics: http://www.statistics.gov.lk/Agriculture/StaticalInformation/rubpaddy

WFP. (2017). *National Stratergic Review of Food Security and Nutrition. Towards Zero Hunger.* Colombo: World Food Programmeme.