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National Agricultural Research Policy and Strategy

2018-2027

Food and Agriculture:
Key to Achieving the
2030 Agenda for Sustainable
Development

Sri Lanka Council for Agricultural Research Policy
Ministry of Agriculture
2018

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Message from the Chairman

Preparation of the Research Policy and Strategy of the National Agricultural Research System (NARS) is an important mandated function of the Sri Lanka Council for Agricultural Policy (SLCARP). The previous policy document prepared in 2011 expired in 2016. SLCARP in 2017 initiated action to prepare the Agricultural Research Policy and Strategy for the next 10 years. Priority was given to review the previous policy in relation to its relevance and adequacy. 2012-2016 Research Policy was re-visited to ascertain its application in the respective Research and Development (R & D) Institutes. It was revealed that R & D agenda of most of organizations were not well within the priorities set by SLCARP. In order to ensure the need to create ownership for the priorities to the respective organization, the present Policy and Strategy were prepared through a process of consultation with all NARS institutes with the participation of scientists. For this purpose intensive discussions and consultations were held with the non-plantation agricultural institutes, plantation sector institutes, livestock & poultry sector institutes, fisheries sector institutes, forestry, floriculture and export agricultural sector institutes.

Directors, Head of divisions and senior scientists made their presentations on research objectives and justification for such research activities. Through this process, policy statements were derived enabling researchers to identify R & D needs in different disciplines to face challenges faced by agricultural sector in meeting the 2030 Sustainable Development Goals, possible impact on climate change and food and nutrition needs to face global population of 9.5 billion in 2050.

The Policy and Strategy document I hope will adequately cover and be flexible in meeting the challenges of the agricultural sector. It is important to record here that we have for the first time covered two important sectors; Palmyrah and Cashew where great potential of improving many thousands of farmers livelihood through R & D in these emerging sectors.

I take this opportunity to thank all Chairmen and Directors of research organizations and private sector organizations for deep commitment to facilitate this process of Research Policy and Strategy development.

Dr. S D G Jayawardena
Chairman
1st December 2017

Message from the Secretary

Sri Lanka Council for Agricultural Research Policy (SLCARP) is the apex body for formulating Policies and priorities for agricultural research in Sri Lanka. The SLCARP previously formulated National Policies on Agricultural Research to address the issues in agricultural sector for the periods of 2003-2010 and 2012-2016. The basic objective of these Policies and Strategies is to develop the agricultural sector to increase its contribution in the Gross National Product (GNP).

Sri Lanka Council for Agricultural Research Policy has gone through rigorous and comprehensive processes of stakeholder consultation, which have led to the identification of issues in different crop sectors. These processes have been successful due to the untiring efforts of the scientists, academia, private sector organizations etc. in various organizations. There were many scientists and stakeholders who have participated in our forums and meetings, and contributed their knowledge to this National Document. The SLCARP also wishes to acknowledge the valuable contribution of all the scientists, academia, private sector organizations, etc to develop this document. The SLCARP also gratefully acknowledges Dr. Fredrick Abeyratne for finalizing this document.

The SLCARP gratefully acknowledges the comments and suggestions of scientists in various research institutions, universities, policy making bodies, private sector organizations, Non-Governmental Organizations and the general public.

I hope this Policy and Strategy Document provides guidelines for policy makers, researchers, scientists, private sector organizations, general public etc. those who are involved in agricultural activities in Sri Lanka.

Dr. J D H Wijewardena
Secretary
1st December 2017

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National Agriculture Research Policy and Strategy: 2018 - 2027

1. Introduction: State of the Agriculture Economy within the Existing Policy Framework

The Agriculture in Sri Lanka is multi-sectoral and comprises of sub-sectors of; plantations, non-plantations, livestock and poultry, Fisheries and Aquatic resources, forestry, and floriculture. Everyone attributes Agriculture as the backbone of the country. Until about the early 1960's, the contribution of the agriculture sector to the economy was high as 32% to the GDP, and 53% toward livelihoods or employment (Thorbecke and Svenjnar 1987)[1]. However, at present the contribution to the GDP is as low as 7.1% and only 27.1% depends on agriculture as a livelihood (Central Bank, 2016)[2]. These changes need to be analyzed in order to evaluate the need for policy changes in this sector.

Since, Sri Lankan economy was converted to an open market economy in late 1970's, the manufacturing and services sector has rapidly increased contributing more towards the economy and have absorbed more of the labour force. This is what is expected, when a country goes through a transformation. But the question is how hasit affected those who are still engaged in the agriculture sector? In Sri Lanka more than 70% still live in rural areas and majority of them depends on the agriculture sector. However, the poverty rate in the rural areas is 7.6% and over 10% in the plantation communities, compared to the national average of 6.7% UNDP, 2014)[3]. In fact agriculture sector contribution to poverty is as high as 40%, which was the highest contributing sector (Gunawardena, 2000)[4]. In addition the slow growth of the Agriculture sector has too is of concern. For example over the past decade the agriculture sector has been growing

[1]Thorbecke Erik and Jan Svenjnar (1987), Effects of Macroeconomic policies on Agricultural Performance in Sri Lanka: 1960-82, OECD, Paris

[2] Central Bank of Sri Lanka, Central Bank Report, 2016

[3] UNDP, Millennium Development Goals Report, 2014

[4] Gunawardena, Dileni, Consumption poverty in Sri Lanka 1985=96. A profile of poverty based household data, 2000

only at a rate of around 4% on average (Institute of Policy Studies (IPS), 2015)5, and more specifically, the last two years due to inclement weather, it has recorded even negative growth.

Past information also shows that poverty rates among households engaged in agriculture (24.1%) to be higher than of non-agricultural households (16.4%) (World Bank, 2007)[6]. Hence, it is of concern that a large percentage of rural people who are engaged in the agriculture sector, is worse off compared to its counterparts in the urban sector, calling for policy changes to make agriculture a paying venture to reduce rural poverty and to contribute towards economic growth of the country.

Having largely achieved most of the Millennium Development Goals (MDG's) Sri Lanka is now challenged meeting the Sustainable Development Goals (SDG's), which aims to end poverty and hunger, among many other goals by 2030. In that context Sri Lanka has to concentrate, while eliminating the disparities in poverty that prevail among different sectors, it needs to eliminate poverty of all forms completely. Also it has to end hunger, achieve food security and improved nutrition and promote sustainable Agriculture. Hence, the policies of the agriculture sector for the next decade and more have to give cognizance to these aspects in meeting these goals.

2. Challenges Faced by the Sector

Apart from increasing living standards of the farming community, there are several challenges the sector is facing at present. They include aspects such as: meeting the food security needs of the people, sustainability of the system due to competition, globalization and climate change, technological challenges such as adoption/non-adoption of genetically engineered crops, managing soil and environment toxicity and degradation due to the non-discriminate use of agrichemicals and soil erosion.

Among these challenges food security concerns override many of the concerns, mainly due to climate change effects. In 2007/2008 period the world experienced such a situation due to food production deficits in many countries due to long prevailing droughts. At present *el nino and la nina* effects are being experienced in many countries, even threatening marine resources and having negative effects even on processes such as pollination due to increasing temperatures.

[5]Institute of Policy Studies (IPS). State of the Economy, 2015

[6] World Bank "Sri Lanka Poverty Assessment" World Bank, 2007

Hence, climate resilience is a fundamental requirement and research has to gear up to this challenge. It is not only increasing productivity, but increasing climate resilient high productivity should be the policy. Not only increase productivity, breeding varieties resistant to pest and diseases too need to be a priority area to reduce water and soil pollution.

The earlier policy to meet food security was food self-sufficiency. But this stand has changed somewhat, since the farming community must earn a sufficient income from their livelihood and the present food crop mixes and technologies are not meeting these needs. Hence, while meeting a critical level of food requirement through local production, farming needs to be diversified to meet the income needs of the farmers, (Some attempts have been already taken in this regard),while rest of the food security needs have to be met by strategies such as increased productivity, buffer stocking, processing and imports. Hence, export sector too needs to be strengthened to meet the foreign exchange requirements to meet food imports as well.

Apart from low labour productivity, one main hindrance for land productivity improvement is issues in land ownership. Most of the lands in wet-zone have not been cultivated due to ownership issues. This also needs to be addressed for land productivity enhancement.

3. Sectoral Performance

3.1. Plantation Sector

This sector comprises the major export crops; Tea, Rubber and Coconut and the crops such as Sugar cane, Cashew, Palmyrah, and Spice Crops. Over 5 % of the population is engaged in the 3 major plantation export sector crops. Over all the major agricultural exports except rubber, have shown positive growth over the last decade (IPS 2015). For example especially, exports of minor agriculture products have grown very impressively. The increasing demand and favorable international prices have been the major reasons. But rubber exports have been affected during the last few years, due to low rubber production because of bad weather conditions, reduced global prices, slowdown in global demand for natural rubber and stockpiles accumulated in major consuming countries, (Central Bank 2014). However, it is important to note although natural rubber exports have declined during this period, exports from value added rubber products have shown a positive growth (RRISL, 2016). Coconut industry is being threatened by

coconut land been converted to real estate development and overall stagnant production levels. Overall, the plantation sector is faced with several problems like, increasing cost of production, labour scarcity, exporting a large quantity as raw material, local products (tea and cinnamon) being blended with low quality products, banning of glyphosate weedicide increasing costs for weeding, land degradation, fluctuating prices and inclement weather conditions. On the social side, especially the living standards of the resident labour in plantation sector are still in a poor condition with respect to housing, health and education.

3.2. Non-Plantation Sector

This sector comprises of several sub-sectors including, paddy, other field crops, root and tuber crops, fruits and vegetables. Paddy is the dominant crop in this sector which has been relatively successful, over the years meeting our rice requirements in most of the years. At the turn of the century the average yield of rice has increased up to 3.9 mt/ha (*maha*) and 4.1 mt/ha (*yala*). Though rice productivity had an increased almost by one mt/ha over the last two decades (IPS 2015), rice farmers have been plagued with , increasing production costs, marketing problems during harvesting time, and crop devastations due to extreme weather conditions. Unlike rice, the yield levels of the other field crops sector has been stagnating for more than a decade. In fact apart from maize, most of our requirements of other field crops have been met with imports, over the last decade. Low productivity, lack of high quality seeds, limited crop diversification to high value crops, low mechanization, high post- harvest losses, low value addition of produce, high price fluctuations, non-demand driven unplanned production, limited use of ICT technologies for information dissemination, lack of coordination among multiplicity of state organizations involved in the industry, lack of credit plus services and facilities, trade barriers including phyto-sanitary requirements, have been identified as areas of concern of this sector.

3.3. Livestock and Poultry

Except poultry, the livestock industry has much room for improvement, with over 3.5 million farm families engaged and contributing to around 2% to the GDP. Despite, many development programmes, the local dairy industry still meets only about 39% of the local requirement[7]and a

[7]Livestock Statistical Bulletin, 2015

large quantity of milk in processed form is still imported. . However, it is encouraging to note many dairy companies, local and foreign owned, are engaged in collecting milk from local producers and is being processed locally. Some of the constraints the dairy industry facing today, include limited availability of high yielding breeds, milk collection is still poor due to non-availability of adequate chilling and processing facilities, and non-availability of improved pasture for feed, with no effective program for pasture production. Farmers do not have enough land to grow improved grass varieties and therefore common pasture lands should be developed with the government support. The poultry industry has been progressing mainly because increased contribution by a few large chickens manufactures in the country encouraged by the measures introduced by the government. However, increasing cost of production; due to heavy imports of poultry feed has been a concern. Over the last decade, with the growth of the local maize production, it has helped both the maize farmers as well as the poultry industry.

3.4. Fisheries and Aquatic Resources

The marine fisheries sector has been having mixed results over the past decade. Until, the cessation of the civil strife there were restrictions on fishing, and in recent time, it has not being a constraint. However, the intrusion of Indian fisher folk to our waters and using of unauthorized gear has been a big challenge. Inland fisheries and aquaculture also have been challenged by the prevailing drought conditions over the last few years. However, despite these limitations, the reversal of the ban on fish exports to the European Union (EU) has been a big boost and already in 2016, Rs 1200 million has been earned through fish exports to the EU[8]. Ornamental fisheries is also now gaining attention, but its growth is retarded due to factors such as, lack of market information, legal issues and problems faced by divers. The growth of the marine fisheries industry is been constrained at present due to use of unauthorized fishing gear, limited facilities in fishing harbours, limited value addition through canning and intruding foreign vessels.

3.5. Forestry

This is a sector which is under constant threat. Deforestation is a serious issue and the forest coverage as of in 2010 was around 27% (IPS 2015). The present forest cover is 29.7% and the government is determined to increase the coverage up to 32% (Forest Department). With forest

[8] http://www.asianmirror.lk/news/item/22025-sri-lanka-earns-scores-rs-1200-million-by-fish-exports-in-2016

cover been reduced, it not only contributes to global warming and its negative effects, especially in the upcountry areas along with non-practicing of soil conservation measures, serious soil erosion and land degradation is taking place having implications downstream with siltation and making water in the reservoirs unsuitable for human use. There is also allegation of clearing forests for human habitation, even in protected areas, which is of serious concern.

3.6. Floriculture

This is relatively a new area for the agriculture sector which is gaining popularity. With the assistance of the Export Development Board, this started as an Agri-business in 1972, and it supports export oriented nurseries throughout the country. In addition the Department of National Botanic Gardens also promotes the floriculture industry for both export and the local markets. The Dept of Agriculture also promotes floriculture.

The main products exported are ornamental foliage plants, cut foliage, cut flowers, flower seeds, flower bulbs, aquatic plants, landscaping plants, and tissue cultured products.

Over the years the local demand too has increased and many growers and exporters earn an extra income by supplying to local the market. Income per unit area is high in this industry and most of growers use net houses/protected houses for their cultivations. Many women and senior citizens too are engaged in this industry and it help to use the underutilized labour source in the country. Hence, this industry has a lot of potential, and need more policy support.

4. Major Policy Changes that is Required

The above account shed some light on the present situation and constraints faced by the industry which needs certain changes in policy, strategy and programmes.

Sri Lankans are generally averse to risk taking. This character is especially so with the farming community and the policy makers been aware of this nature have been reluctant to make bold policy changes in the past. This is reflected; in the limited diversification of the agriculture systems based on changes in demand and consumer preferences, dependency on the state for various hand out/subsidies for mostly a subsistence form of agriculture lacking efficiency, exportation of mainly of raw material without value addition, and high post-harvest losses due to traditional practices of packaging, transportation and retailing.

Agriculture, especially the small farm sector was not geared towards business principles. It was merely a livelihood passed down the generations, especially practiced now as the last resort by many, due to lack of skills and lack of alternative employment opportunities. At present, with the ageing population and youth unwilling to engage in traditional agriculture, the sector is challenged to a great extent.

In a globalized world with ever increasing competition and in the face of diversification of the economies, if the agriculture sector is to survive, and make the lives of those who are employed in the sector better, a new thinking is required. Agriculture has to be thought as a business, many traditional practices need to give way to modern practices. It should not be the last resort, but the first choice based on you aptitudes and the opportunities available. Hence, to meet the constraints identified earlier major changes in policy are required which is discussed later.

Food security needs has to be partially (a critical level) met through local production, and the rest has to be through strategies such as increased productivity, processing, reduced postharvest losses (wastage), buffer stocking and imports.

Also as noted earlier, due to negative effects of climate change and concerns of quality of food, productivity increase need to factor aspects such resilience to adverse climate conditions, and resistant to pests and disease to reduce use of agro-chemicals.

5. Mandate of the Sri Lanka Council for Agriculture Research Policy (SLCARP)

The Sri Lanka Council for Agriculture Research Policy (SLCARP), (Act No. 47 of 1987), is the main State authority which has the mandate to formulate the National Agricultural Research Policy and priorities, among other tasks. This document is prepared under this authority.

SLCARP has already prepared similar documents covering the period 2003-2010 and 2012-2016. Having prepared these documents it was also instrumental in preparing National Research Priorities by the following National Committees:

1. Crop Improvement and Agronomy.
2. Agricultural Bio-Technology
3. Plant Protection

4. Post-Harvest Technology and Human Nutrition
5. Natural Resource Management, Sustainable Agriculture and Climate Change
6. Organic Agriculture
7. Forestry
8. Floriculture Research and Development
9. Livestock and Poultry
10. Aquatic Resources
11. Agricultural Mechanization.
12. Socio-Economic and Policy Analysis

So far three documents covering the periods, 2005-2010, 2010-2016, 2017-2021, identifying research priorities have been produced. It is noteworthy, CARP is now rigorously monitoring, research activities of the National Agriculture Research System (NARS) to ensure research undertaken is in-line with the priorities identified, to achieve national goals with the limited resources available.

The present exercise is to prepare the **National Agricultural Research Policy and strategy** covering the period 2018-2027. The document will identify policy statements and strategies that focus on the research required, in producing the outcomes of strategies and programmes in line with National Policy and strategy for the development of the sector towards economic growth of the country.

6. The Available Policy Documents for Guidelines

The National Policy and Strategy of the state is what will drive the sectoral policies, their strategies and programmes. This alignment is necessary in achieving national goals. The new government which was elected early 2015 has set out its policy agenda in two documents.

1. Policy statement of Hon. Prime Minister to the Parliament on 5th November 2015.
2. Vision 2025 policy document launched by HE. The President and the Hon. Prime Minister on 5th September 2017.

This policy Documents sees the agriculture sector in a visionary nature by formulating policies which goes much beyond the traditional thinking, and is in line of the future demands of a globalized world.

The Government Vision is two fold:

1. To make Sri Lanka a rich country by 2025. It will do so by transforming Sri Lanka into the economic hub of the Indian Ocean, with a knowledge-based, highly competitive, social-market economy.
2. Position Sri Lanka as an export-oriented economic hub at the center of the Indian Ocean.

In this section we reproduce some of the statements from the Vision2025 document which has relevance to agricultural research policy.

It identifies "Sri Lanka's agriculture sector suffers from low productivity and leads to food insecurity and poverty. Productivity of domestically grown food crops, including rice, has stagnated at unimpressive levels even by developing country standards. Sri Lanka had an estimated 4.7 million people undernourished in 2015 with high regional disparities in malnutrition. Malnutrition was especially high in the estate sector. Government policies have exacerbated food insecurity with ad hoc policy changes of import duties and non-tariff barriers".

In order to meet these challenges the following policy guidelines are identified for the agriculture sector. It needs to be noted, this sector cannot stand alone to achieve national targets but need to be implanted in tandem with the other sectors.

1. The Government will facilitate efficiency in agricultural markets. The Government will facilitate crop production and improvement, agribusiness development, establishment of large-scale agro-enterprises, and introduction of high yield crops. Major initiatives include a National Food Production Programme, establishing agricultural mega-zones, and strengthening value chain development.

2. The Government will promote private sector participation and PPPs where feasible. The Government will encourage the private sector to modernize the agriculture sector, and to

introduce efficient and stable modern value chains through models such as trader-farmer contracts, contract grower systems, and agriculture mega zones. The Government will introduce an Agriculture Logistics Network (ALN) through a PPP that incorporates state-of-the-art solutions for storage and transportation, ICT to improve information asymmetries, and real-time monitoring for effectiveness.

3. The Government will expedite the proposed Agriculture Sector Modernization Project**-.** The Government will introduce an incentive structure for SME agribusinesses to invest in commercial agriculture and value chains. This will promote partnership arrangements between the private sector and smallholder producers; demonstrate new technologies to enhance productivity, resilience, and diversification; and promote technology diffusion.

4. The Government will encourage the plantation sector to modernize. The Government will push plantations to become more internationally competitive while ensuring decent living standards of plantation communities. This includes exploring new niche markets, promoting value addition in tea for re-export, and private sector entrepreneurship in rubber, coconut and sugar production.

5. The Government will help smallholders in the tea, rubber and non-traditional export sectors. The Government will help smallholders improve production and processing, enhance productivity and align their products to take advantage of global market opportunities. Also, the Government will offer short-term price support in the event of a sudden global commodity glut or collapse in price.

6. The Government will promote investment in the livestock sector. Credit facilities will be made available to encourage investment in value addition and development of milk-based products. The Government will also provide support for the poultry industry.

7. The Government will promote investment in the fisheries sector. The Government will develop a national policy for the fisheries sector and fish stock assessment in marine fishery to enhance fish quality and productivity for a sustainable fishery industry. The Government will encourage private sector participation in harbor business development, aquaculture development and the establishment of fishery mega zones. The Government will relax foreign investment restrictions for deep sea fishing, to attract investment to the sector.

8. The Government will promote a Smallholder Agribusiness Partnership (SAP) project to enhance competitiveness. The SAP establishes and scales-up public-private producer partnerships (4Ps) in agribusiness. It enables inclusive rural financial services provision, joint financing, and risk sharing, thereby empowering smallholder farmers as business partners. The Government will facilitate linkages between smallholder producers and modern value chain actors.

9. The Government will encourage nutritious farming practices. The Government will introduce a national level policy action on food quality and permitted fertilizer levels. This will ensure that organic products are sufficiently available in markets.

The Research Policy Statements and Strategies were developed, in achieving the above national policy objectives of the Agriculture sector

7. Process of Developing Policy Statements and Strategies

Taking these policy guidelines, a process was set up by the SLCARP to develop Agricultural Research Policy Statements and strategies. Several sectoral workshops/consultations were held to draft the research policy statements based on the constraints faced by each sector and where research need to be conducted in line with National Policy Objectives. These statements were fine-tuned by a further stakeholder consultation initiated by SLCARP in September 2017. Further to these consultations, the 12 National Committees were also engaged to come up with policy statements on the same lines. The National Committees are not on sector lines hence, cross cutting aspect were taken into consideration.

Process Undertaken:

1. Two meetings with the participation of 12 Chairpersons of the SLCARP National Committees to discuss the setting up of the themes
2. Sectoral workshops representing all related research institutes to gather initial form of the policy statements
3. Individual National Committees and CARP officials refined them further
4. These refined statements were forwarded to the respective Directors of the Institutes for further refinements (of the subject matter)

5. After refining them, CARP compiled them sector-wise and held a Final Consultative Workshop on 29th September with the participation of senior official representing all the research institutes, consultant appointed by the Council refined the statements further with their agreement.

6. Statements refined have been submitted to the Consultant appointed to draft the 1st version of the document.

7. Final draft version was submitted for Public Comments

8. After incorporation of the comments the **Final Version** was completed and published.

The outcome of these deliberations is the following statements.

8. The Policy Statements by Different Sectors

8.1 Plantation Sector

8.1.1. Tea Sub-Sector

1. Crop improvement and quality enhancement

To generate and apply scientific knowledge and technologies; for enhancement of yield and for resilience to adverse climate conditions, to develop varieties resistant to pest and diseases, for use of integrated pest management techniques to reduce chemical use, to develop cost effective and environmentally sound nutrient (organic and chemical) packages, including bio-pesticides and bio-fertilizer for restoration and improvement of soil fertility status, to introduce environmentally sound cropping systems and farming technologies suitable for different agro-climatic conditions, and to improve quality of Ceylon tea in the most profitable manner, ensuring increased incomes to the national economy and a better livelihood for the communities.

2. Increase labour productivity and energy conservation.

Ensure introduction of ergonomically and environmentally sound, cost effective labour saving mechanization technologies including energy saving technologies, to increase labour productivity, profitability and product quality.

3. Value addition, product development and diversification

Develop value added tea products promoting health benefits, whilst ensuring Ceylon Tea identity and meeting emerging global market requirements.

8.1.2 Rubber Sub-Sector

1. Crop improvement

Ensure development of high latex, timber and biomass yielding clones, through suitable nursery techniques, replanting cycles, plant protection & harvesting techniques, environmentally safe nutrient systems, water and weed management systems, and rubber based inter cropping systems for both the estate and smallholder sectors.

2. Global competiveness and profitability

Develop economically & environmentally sustainable innovations and efficient technologies in the areas; of value added rubber based wood and latex products, new market models, markets, marketing systems, increasing energy use efficiency through recycling methods and waste management, use of IT for information management and technology adoption, and to attain and sustain global competitiveness of the rubber industry.

3. Worker use efficiency

Increase worker use efficiency through appropriate mechanization and management systems, for the sustainability of the rubber industry.

8.1.3 Coconut Sub-Sector

Ensure the sustainable management of the coconut sector through generating new knowledge on crop improvement, minimizing crop losses, improving resource use efficiency, improving the efficiency of the market value chain to meet the global competitiveness of the coconut industry while targeting to uplift the livelihood of the stakeholders.

1. Crop improvement

Promote development of high yielding, heat and drought tolerant, pest and disease resistant coconut cultivars, and improve resource use efficiency by introduction of of Good Agriculture Practices (GAP) such as Integrated pest management (IPM) techniques, soil and soil fertility improvement technologies, moisture conservation material and technologies and developing and promoting

suitable coconut based crop models, crop-livestock-pasture models, and mapping suitable land for coconut with soil and climate information, to uplift the livelihood of all stakeholders.

2. Global competitiveness

Ensure the sustainability of the Coconut industry via improving the efficiency of value chains to meet global competitiveness, including; processing and product development through developing new high value products for local and the international markets, strengthening quarantine measures, better yield and price forecasting, and public-private partnerships**.**

3. Worker use efficiency and to reduce cost of production

Promote use of cost effective mechanization for coconut harvesting, fertilizer application, placement technologies for predatory mite sachets (for controlling coconut mite), and introducing automated upgraded machinery for efficient and hygienic production of coconut and coconut based products for local and international markets.

8.1.4. Sugar Cane Sub-Sector

1. Crop improvement

Develop/Introduce high yielding varieties with an overall average yield of 100 t/ha, under different water regimes, resistant to pest and diseases and by improving degraded soil, and to reduce cost of production by at least 10%.

2. Marketing and value addition

Promotion of processing of the sugarcane industry by-products - cane tops into animal feed, filter-mud and vinasse into organic manure, molasses into ethanol, and generation of electricity from bagasse.

3. Technology transfer, public private partnership & other

Provide an enabling environment for carrying out research and development activities to contribute to integrated development of the Sugarcane Industry

8.1.5. Export Agriculture Crop (EAC) Sub-Sector

1. Crop improvement

Promote varieties/cultivars with improved yield and quality parameters which have high demand including exotic export types, resistance/tolerance for major pests, diseases and abiotic stresses, and use of Integrated Plant Nutrient Systems with contaminant isolation. Develop export agricultural crop based cropping systems for different agro-ecological zones.

2. Labour use efficiency and public private partnership

Development and promotion of machinery for cultivation and processing to improve labour use efficiency and quality improvement of EACs, with public private partnerships.

3. Marketing, value addition and global competitiveness

Develop and introduce new value added products of EACs, based on intrinsic quality of EAC crop products and global demand with accredited quality and services. Identify new international markets, including niche markets and new market avenues to enhance foreign exchange earnings.

8.1.6. Cashew Sub-Sector

1. Crop improvement

Ensure high productivity through selection of high yielding, high quality, pest & disease resistant cultivars with wide range of adaptability.

2. Improve rate of adoption of new technologies through practicing Good Agricultural Practices (GAP) for sustainable cashew cultivation and introduce intercropping models, to enhance the livelihood of all stake holders' in the cashew industry.

3. Marketing & value addition:

Improve and use of new processing technologies and develop value added products of Cashew nut, Cashew apple, Cashew nut-shell liquid and other allied products using commercially viable methods to enhance productivity, sustainability and to reduce post-harvest losses, in response to changing market behavior, nationally and internationally.

8.1.7 Palmyrah Sub-Sector

1. Crop improvement

Ensure high production, high profit and better living standards of producers, through crop improvement by introducing new cultivars with desirable characters, and practicing sound agronomic practices including mechanization, and optimization of land use with high intensity mix cropping.

2. Value addition

Production of healthy and value added products with new market opportunities with private public partnerships, to increase profitability and to improve the living standards of Palmyrah producers.

8.2 Non-Plantation Sector

8.2.1. Rice Sub-Sector

1. Crop (productivity) improvement

Increase productivity and quality (with sensory, nutritional and safety characteristics) of rice through improved rice varieties, increased use efficiency of external inputs, including mechanization to ensure no hunger, increase profitability, food security in staple food requirements and improving living standards of the rice farming community.

Develop high yielding varieties resistance to biotic-stresses such as pest & diseases and tolerant to abiotic stresses including resilience to emerging climatic changes and adapted to irrigated and rain-fed farming conditions, and use of mechanization as a solution to labour shortage and low youth attraction to the sector.

2. Value addition for consumer preference

Development and linking to the value chain for rice based value added products with Public Private Partnerships considering consumer preferences, demand for traditional varieties as well as suitable varieties for the export market.

8.2.2. Other Field Crops Sub-Sector

1. Crop productivity improvement

To ensure high productivity, land use efficiency and profitability, develop high yielding and quality varieties (with sensory, nutritional value, and value added consumer preference characteristics), through varietal improvements using cutting edge/associated technologies andimproving crop agronomy adopting higher technologies.

2. Enhance input use efficiency and reduce unit cost of production

Reduce unit cost of production through, input use efficiency including labour, seeds, fertilizer, and agrochemicals.

Enhance land and water use efficiency and water productivity, using water saving irrigation technologies and water harvesting.

8.2.3. Vegetable Crops Sub-Sector

1. Crop improvement:

Development of new high yielding demand driven and climate resilient varieties of vegetables and quality seeds, adaptable to mechanization and having high degree of tolerance to biotic and abiotic stresses, with quality (high nutritive value, sensory and long shelf life), and suitable to open field and protected cultivation environments for year round production.

Promote vegetable crop R & D and cultivation, using technically sound, economically viable and environmental friendly technologies for diverse cultivation environments to enhance production and to ensure food safety.

2. Marketing and value addition

Appropriate action to minimize price fluctuations by enhancing availability of value added products of vegetable while reducing post-harvest losses, towards increasing consumption from 100 130 grams to 200 grams of vegetables per capita.

8.2.4. Fruit Crops Sub-Sector

1. Increased fruit supply

Increase the national fruit supply to ensure increase fruit consumption, through identification and introduction of diverse native and exotic fruit crops, which could be grown year round under different agro-ecological conditions, and through use of technically sound, economically viable, environmental friendly and socially acceptable technologies.

2. Value chain development

Identification and linking to value chains, to promote production of quality and safe value added fruit products for consumption in local and foreign markets, meeting acceptable standards.

8.3. Livestock and Poultry

1. Livestock product availability for consumption

Improve livestock produce and nutritional security, by increasing local productivity through appropriate breeding and reproductive technologies and cost effective feeding strategies, specially of cattle and poultry, which ensures safety and health of the animals and the industry and better living standards of the farmers as well as the consumers.

2. Quality and safety of food

Ensure Provision of quality and safer livestock and poultry products (meat & eggs) to consumers which encompass all attributes such as, freshness, nutritive value, wholesomeness, taste and origin.

3. Marketing and profitability

Promote both fundamental and applied research to maximize the productivity and profitability of livestock and poultry under different production systems with a well-organized marketing network, and waste management to produce environmentally safe livestock by-products.

4. Ensure welfare aspects of livestock and poultry by provision of better transportation, proper housing and management, as well as changing the attitudes of the general public through instruments such as new laws.

8.4. Fisheries and Aquatic Resources

1. Marine biological resources

Ensure conservation, management and development of marine and costal living resources and habitats with the aim of sustainable utilization through application of environmentally friendly, efficient and effective fishing crafts and gears with the adoption of voluntary guidelines for small-scale fisheries.

Ensure prevention of illegal, unregulated and unreported (IUU) fishing and conservation of critical coastal habitats and integrated coastal zone management.

2. Inland aquatic resources and aquaculture

Promote research towards development, conservation & improve the productivity of the aquaculture industry though the introduction of new technologies while ensuring the sustainability natural systems. Research on export-oriented aquaculture, aquaculture of non-traditional aquatic species, culture-based fisheries and other environmentally friendly fisheries enhancement with an ecosystem approach to aquaculture. Promote research on molecular biological screening of pathogens, and genetic improvement of brood stocks.

3. Post-harvest technology, value addition and marketing

Research towards introducing improved value added quality fish and fisheries products while ensuring zero waste and ensure food safety and high nutrition levels to ensure well-being of the fisher folk, the consumer and strengthening entrepreneurships.

4. Oceanography and hydrography

Develop and coordinate research to understand, predict and forecast ocean and marine processes and resources for economic development, environmental sustainability and safety at sea and Research on relation to migratory fish stocks with oceanographic processes.

Develop and coordinate bathymetric survey of ocean, marine and inland water to facilitate infrastructure and aquatic resources development and management.

8.5 Forestry

1. Sustainable management of forest resources

Promote sustainable management of forest resources for ecosystem services (water shed protection, soil conservation, biodiversity conservation and forest products), adapted to climate change and appreciate and use traditional knowledge and practices on forest use.

Adoption of strategies for the management and protection of natural forests, forest plantations and tree growing on environmentally sensitive areas through public private partnerships and restoration of degraded forests through science based technologies.

2. Forest productivity improvement

Development and use of appropriate technologies for establishment, management and harvesting of industrial forest plantations while improving and sustaining land and other forest resources.

Planned conversion of forests into other land uses for development projects based on sound scientific research.

3. Marketing and value addition

Technology improvement and use for forest product utilization and value addition of wood and non-wood forest products. Promote cottage industries and develop marketing channels for forest based commercial production

4. Promote and coordinate research by all related parties

Promote and coordinate research by various parties to effectively support the requirements of beneficiaries in line with sectoral policies and international conventions.

8.6 Floriculture

1. Productivity improvement

Improve Productivity and Profitability in the floriculture sector through varietal improvement and value added products, to generate high incomes by exploring local and export markets, including niche markets to assist livelihood development and poverty alleviation.

2. Product quality

Enhance product quality through, innovation and adaptation of new technologies and through use of labour saving techniques.

8.7. Cross Cutting Research Policy Areas

1. Natural Resources Management

1. Understanding & management of agricultural and natural ecosystems towards optimum use of arable land and minimizing adverse environmental impacts, focusing on aspects such as land degradation, climate change, sustainable use of water resources including drainage.

2. Ensure sustainable agriculture though sustainable management of land, soil and water resources, using all possible legislative, technical and social knowledge and guidelines while protecting the environment to achieve food and nutrition security.

3. Ensuring resilience to natural calamities, under changing climate patterns and biodiversity, through adaptation and mitigation techniques.

2. Plant Genetic Resources, Quarantine Services and Seed Certification

1. Conserving of local and exotic Plant Genetic Resources for Food and Agriculture (PGRFA) and supporting sustainable utilization.

Ensuring safe and effective pesticides use in agriculture assuring human health and environmental protection.

2. Ensure sustainability of agriculture, related industries and biodiversity through assuring regulated international movement of pest free plants and plants products with viable technology innovations, assuring the availability of quality seed and planting material.

Ensure efficient, safe, low cost, and environment friendly pest and invasive alien species management.

3. Organic Agriculture

1. Developing efficient pest, diseases and weed control measures that are beneficial for commercial level certified organic agriculture producers who cater to the local and developed country markets.

2. Develop sounds organic agriculture practices which are environmentally prudent, economically viable and nutritionally sound for secured food production, and also by revisiting the traditional agriculture knowledge base.

3. Develop standards for organically produced agricultural products and ensure organically produced agricultural products are introduced with appropriate certification.

4. Farm Mechanization

1. Introduction of appropriate mechanization to increase efficiency of production through increased labour productivity and meeting labour deficit situations, complimenting other biological and chemical technologies, use of more efficient tools and implements in conjunction with these power sources, enhancement of product quality, and quantity while ensuring environmental friendly cost effective agriculture.

2. Ensure precision agriculture and timely cultivation with introduction of suitable mechanization solutions with different power sources (including solar) and by adaptation of imported machinery to local conditions.

5. Food Waste Management

1. Promote sustainable methods to manage agricultural waste.

6. Socio Economic and Planning

1. Establish appropriate institutional frameworks to improve coordination and delivery of effective rural advisory, information and financial services including the use of information technologies to achieve sustainable agricultural intensification and better market access.

2. Strengthening the capacity of local service providers to support farmers specially farm women (in land ownership, gender sensitizing technology and ownership to capital), farmer organizations and rural communities, as well as human capital of government agencies.

3. Promotion of research on developing sustainable business models and partnership arrangements for small farmer participation in agribusiness and value chain development.

4. Continuous evaluation of technologies and varieties released for giving quantified feedback for further adjustment/improvements of research programs

7. Agricultural Trade and Investment

1. Promote research to assess the ex-ante and ex-post effects of agricultural trade policies, domestic and foreign investments, trading agreements and to examine trends and patterns in international trade in agricultural commodities and their investments.

8. Employment, Labour Use, Institution, Land and Rural Development

1 Promote research on labor productivity and labor market in the food crop sector.

9. Public-Private Sector Engagement

Establish a conducive legal and institutional environment to promote and encourage private sector involvement in agriculture R&D and for public-private partnership formation.

10. Enabling Environment, Capacity Building and Retention of Scientists

Bringing all research organizations into one category titled “Research Institutions” for uniformity in management structures and operational procedures.
Establish a transparent recruitment, promotions, training (post-graduate and short term) and a remuneration system, to motivate and retain scientists and technicians, and recognize the contribution by scientists in respective sectors to national development.

9. Conclusions

Sri Lanka has made significant strides in the agriculture sector, over the past few decades, especially in rice, spice crops, and few other field crops. However, in the other sectors the potential has not been exploited and the living standards of the rural and estate communities, who are mostly engaged in agriculture, are having poor standards of living. The sector is constrained by low productivity, increasing cost of production, post-harvests losses, non-conversion to value added products, fluctuating prices, lack of diversification to high value farming systems and inclement weather patterns.

Considering these constraints, the Government has developed its Vision 2025, policy document to convert the agriculture sector to a value added business among other strategies. Using this as the major guide line, various research organizations of the National Agriculture Research System as well as the private sector, under the leadership of the Sri Lanka Council of Agricultural Policy SLCARP), has developed Research Policy Statements for each sector. This exercise culminated with the development of the "**National Agricultural Research Policy and Strategy 2018-2027".**

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