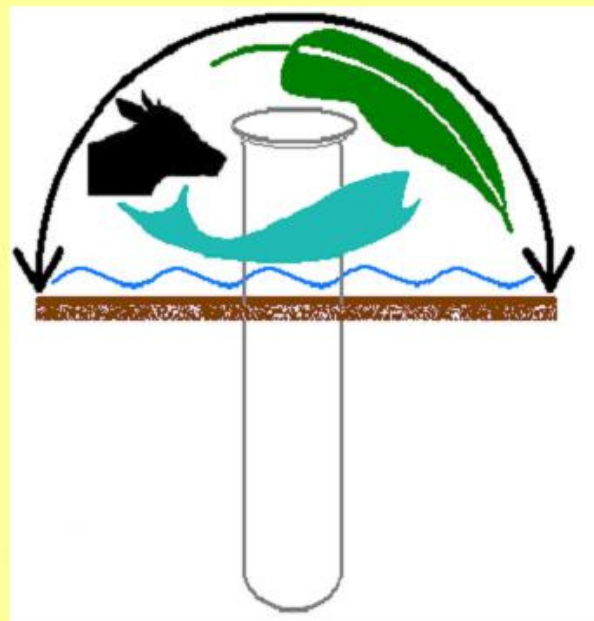


National Agricultural Research Plan (NARP) of Sri Lanka 2011-2013



2012

Sri Lanka Council for Agricultural Research Policy

Ministry of Agriculture

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**National Committee on Research Programmes and
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National Committee on Agricultural Biotechnology

National Committee on Plant Protection

National Committee on Agricultural Machinery and Equipment

National Committee on Post Harvest Technology and Value Addition

National Committee on Floriculture Research and Development

National Committee on Organic Agriculture and Agro-Forestry

National Committee on Socio-Economics and Policy Analysis

National Committee on Livestock, Aquaculture and Fisheries

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Foreword

National Agricultural Research Plan (NARP) for 2012 being presented in this document is the culmination of months of strenuous effort and dedication of all scientists and officials of SLCARP, National Committees and the National Committee on Research Programmes and Projects (NCRPP). The Chairman, Secretary/ Director and the SLCARP Council members take pride in recommending and presenting this strategic document for funding by the Treasury to develop future technologies necessary for the agricultural and socio-economic development of this country. Developing a comprehensive NARP document is an absolute challenge and is a continuously improving process rather than static. We hope to be even better in our endeavor in reaching the highest level of comprehensiveness in compiling the NARP and research management in future. The Chairman, Secretary/ Director and the SLCARP Council members send greetings herewith for Sri Lanka's social and economic prosperity through better agricultural technologies and practices.

Dr Jayantha Dias Samarasinghe

Chairman

Sri Lanka Council for Agricultural Research Policy

Prabath Wimal Kumara

Secretary/ Director

Sri Lanka Council for Agricultural Research Policy

The National Committee on Research Programmes and Projects (NCRPP) worked in cooperation with all 10 National/ Specialist Committees of SLCARP in preparation of the National Agricultural Research Plan (NARP) 2011-2013/ year 2012. Specialist Committees evaluated, emended/ improved where necessary and recommended the research programmes/ projects in their subject are/s and forwarded same to NCRPP. NCRPP reconsidered all the research projects in finalization them and incorporated in to NARP 2012.

NARP 2012 however does not illustrate the whole picture of the agriculture research concluded in Sri Lanka in year 2012 as the institutions which conduct agricultural and agriculture related research did not submit their full research programmes and some institutions did not submit any research programme to NARP 2012. This situation would be corrected with assistance of all relevant institutions and the National Budget Department/ Ministry of Finance and Planning. When all the prioritized, nationally important research in agriculture and related fields of a particular year are combined into one plan only, it really would be a National Plan. Then the Ministry of Finance and Planning could consider them for funding and necessary action. This task would be fulfilled by NCRPP and SLCARP in future.

Monitoring of the research programmes/ projects of the NARP 2012 would be done by the Specialist Committees and NCRPP of SLCARP.

We wish to express our gratitude to all NCRPP members, members of all Specialist Committees of SLCARP, Chairman/ Director/ SLCARP Council, SLCARP Staff and Researchers/ Heads of relevant institutions for the support given in preparation of NARP 2012.

We specially thank Mrs Hiroshine Samarajeewa who did the type-setting work of NARP 2012 document.

Dr Jayath Kirthisinghe

Chairman

National Committee on Research Programmes and Projects of SLCARP

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Introduction

1. Overview of Agriculture Sector in Sri Lanka

The agriculture sector in Sri Lanka plays a key role in the economical development in the country and its new role in the future has now been redefined in the light of the new development vision and the future aspirations of the nation. At present, agriculture contributes about 13% to the GDP of the country and employs about 33% of its workforce (Mahinda Chintana- Vision for the future). 60% of the population still live in rural areas and mainly are engaged in agriculture as a livelihood.

The fundamental challenges facing agricultural development in Sri Lanka are, firstly to increase domestic food production in a sustainable manner to feed the gradually increasing population and secondly, to increase the volume of exports, traditional as well as the non-traditional exports to increase foreign exchange earnings. The population in the next 30 years is expected to increase by an additional 05 million and food production has to be geared to meet their demand. To achieve the required levels of food production, when the land area is limited, the only available option is intensification of current agricultural production through use of modern technologies. Agricultural intensification will require a paradigm shift from current practices to orient the production – utilization chain to meet the new challenges. This will require us to probe into new technologies.

Then there is the challenge of more and more cheaper agricultural produce coming in to the country. Above all, Agriculture has to meet the challenges of high costs of imported inputs and high cost of labour. While meeting these challenges, the agriculture sector, has to continue to contribute to the economy by way of creating employment opportunities, meeting food security needs, supplying raw materials for the industries and earning foreign exchange. In order to achieve these results, agriculture sector in the future has to be effectively competitive.

2. Crops and Sectors

Agricultural crops/ sectors are rice (staple food crop), other field crops, vegetables, fruit crops, export agricultural crops, plantation crops (mainly tea, rubber, coconut), spices, forestry, newly emerging floriculture, natural resources management, agricultural engineering/ mechanization, organic farming, livestock and fisheries.

Rice

Paddy occupies 40% of the agricultural land. Being the staple food of Sri Lankans, rice has become the main source of calorie requirement of the people. At present, Sri Lanka is almost self sufficient in rice. The national policy in rice is to produce rice varieties having export potential and use the surplus grains for rice based industries.

Ministry Agriculture has launched programmes through Rice Research and Development Institute to develop high yielding and better quality rice varieties for the national need. There are 59 inbred rice varieties and a few hybrid varieties have been developed by the RRDI of the Department of Agriculture.

Other Field Crops

The other field crops (onion, chilli, groundnut, soybean, green gram, black gram, kurakkan, maize, cowpea etc.) are being given by the Government high priority for further expansion. Ministry of Agriculture is continuously taking steps to accelerate the production growth of these crops by following research and development initiatives towards the development of high yielding varieties, good quality seeds and advanced cultivating practices. Target of self sufficiency of these crops would be achieved together with enhancement of incomes of farmer communities and generation of rural based employment.

Fruits

The policy of the Government is to explore the full potential of the sector by increasing the production of fruits to attain near self sufficiency by 2020. The fruit sector will be expanded on commercial basis to develop the fruit industry for promoting exports. The cultivation of fruits also in home gardens is being promoted by the Ministry of Agriculture.

Attention on conservation, cultivation and consuming of indigenous/ under-utilized fruits has to be paid as these fruits are highly nutritive and these species are a valuable genetic resource of the country.

Vegetables

Use of high quality planting material/ hybrid seed technology, improved cultivation practices, minimizing post harvest losses, creation of appropriate marketing mechanisms are essential measures for development of the vegetable production. The vegetable sector has also immense potential for export. The national policy aims at improving the production systems and investment on high-tech precision agricultural techniques to encourage the production of exportable vegetables.

Vegetable cultivation is promoted, encouraged and facilitated by the Ministry of Agriculture by its “Api wawamu – Rata nangamu” programmes. Significant achievements have been made. Linking the marketing networks directly with the producers, encouragement of SMEs and private sector to produce vegetables and creation of appropriate environment for investment in cultivation are being carried out. Excess production during the seasons has to be converted in to exportable items by modernizing the processing industry in the country.

Floriculture

Floriculture sector, mainly a private concern, has made rapid progress in the last two decades by entering into the export markets. The Sri Lanka could be one of the best quality production centres for Floriculture products in the world. The national policy promotes expansion of this sector for local and international markets with financial and infrastructure support. The Government targets to establish 1,500 floriculture villages in the Western, North Western, Central provinces and to generate 30,000 jobs in rural and sub-urban areas.

Agro-Forestry

Present forest cover in the country is 23% - 1.055 million hectares. Government strategy is to replant all types of forests to ensure their biodiversity. Forestry research is mainly undertaken by the Forest Department through a multi-sectoral committee by the linking research and extension services.

Export Agricultural Crops

The production of export agricultural crops comprising of spices, cinnamon, pepper, clove, cardamom, nutmeg, cocoa and coffee is increasing and recently new crops such as vanilla, lemongrass and garcinia have been included. These crops have a significant position in the national income and export earnings. Sri Lanka was a pioneer exporter of natural spices to the world market and maintains its reputation in international markets.

The national policy aims at strengthening the sector by doubling the extent of these crops by 2020. Government emphasizes on exporting of spices in value added form rather than primary products and research and development in this regard will be given high priority.

Plantation Crops

Plantation crops mainly Tea, Rubber and Coconut are grown in an extent of 0.74 million hectares or 12% of the land area of the country. Apart from major plantation crops, supplementary plantation crops such as, Cashew, Sugar and Palmyrah are targeted for expansion.

Coconut: An up-ward trend in coconut production has been experienced in recent years. Government plan is to intensify New planting of coconut by providing inputs – seedlings, fertilizer and technological practices The coconut industry is being re-vitalized and large scale planting material distribution and improved cultural practices are being advocated by the Coconut Research Institute of Sri Lanka.

Rubber: Rubber cultivation and production have dropped temporary during the previous decade due to price crisis in the Asian rubber market. As the local rubber product industry is growing fast, in order to meet the demand of raw rubber for such industries an accelerated planting of 40,000 ha in the Moneragala district has been launched by the Ministry of Plantation Industries. In addition, rubber cultivation is being expanded to other areas of the Intermediate Zone and high elevation of Sri Lanka. Feasibility of growing rubber of Dry Zone of Northern and Eastern Provinces is being investigated by the Rubber Research Institute of Sri Lanka.

Tea: The production shows an encouraging picture in terms of production and prices. Improved management practices through privatization of tea estates have a positive impact. Improvement of the low country tea production and prices may have been a significant contributory factor to this scenario. Of the total tea production, only 42% is marketed in value added form. Government expects to increase the value addition to the tea up to 75% by 2020.

Natural Resources Management

The intervention of the Government will be made to protect water resources, catchments areas and ocean/ aquatic resources and to prevent air pollution and soil erosion. The “Haritha Lanka” programme has been launched for the purpose. In coordination with the Ministry of Agriculture and other stakeholders, the innovative methods such as integrated plant nutrient management, usage of organic fertilizer and green house technology will be introduced to the agricultural sector to prevent environmental pollution. In addition, renewable energy sources will be established to negate the effects of certain forms of pollution.

Mechanization

Mechanization of the agricultural sector by modern and efficient machinery and equipment is necessary to establish cost-effective, sufficient, high-quality agricultural productions.

Organic Farming

Organic agriculture is production system that sustains the health of soils, ecosystems and people. It relies on ecological processes, biodiversity and cycles adapted to local conditions, rather than the use of inputs with adverse effects. Organic agriculture combines traditions, innovation and science to benefit the shared environment and promote fair relationships and good quality of life for all involved.

Government has identified the organic agriculture as an important sector to increase crop production and also to reduce the use of chemical fertilizer. Ministry of Agriculture has launched a project in 2008 to popularize the use of organic fertilizers. Government has allocated funds for this programme and farmers island-wide are being trained and led to produce and use organic fertilizer and conduct organic farming.

Livestock

Livestock sector engages about 670,000 smallholders and contributes about 1% to the GDP, which is much lower in comparison to other regional countries. The main species of animals that dominate the livestock sector are dairy, poultry and pigs. The dairy industry consists cattle, goats and buffaloes.

The Government objectives of the livestock sector are to achieve a higher level of self-reliance in milk and livestock produce, provide them to consumer at an affordable price for improving their nutrition status and tapping its potential for creation of employment. Livestock policy encourages the private sector to get engage in commercial operation while public sector investment will gradually be directed to regulatory activities, research and extension services to the areas where returns on investment are not attractive to the private sector but are essential to the development of the industry. Improved breeds, availability of quality pasture/animal food, better animal health, proper collection and processing network, research and extension are important factors in increasing production. Future strategies will therefore concentrated in these areas with both public and private sectors (Mahinda Chintana- Vision for the future).

Fisheries

The fisheries sector contributes around 1.2% to GDP and employs over 650,000 people directly and indirectly through related activities. As Sri Lanka has considerable fisheries potential in coastal, offshore/ deep sea, inland fisheries and aquaculture, the Government is targeting

self-sufficiency in the national fish supply and a significant increase in fish export.

Increasing the sustainable production of fish and other aquatic products, emphasizing on post harvest technologies, marketing methods, coastal ecosystems, enhancement of the socio-economic status of fisher communities/ industry stakeholders and management/ conservation of ecological resources in relation to fisheries and aquaculture are necessary for the up-lifting of this sector.

3. Agricultural Research in Sri Lanka

Agricultural research has made substantial contributions to the overall productivity growth since independence. There is no doubt that agricultural research will have to play a dominant role in the future than in the past due to increasing population, scarcity of land/ water and will also have to be competitive under the prevailing open market policies and trade liberalization. Hence agricultural research has to respond to the new challenges by generating technologies to increase productivity and the quality of production of the agricultural sector.

Gross Domestic Expenditure on Research and Development (GERD) in Sri Lanka, a key indicator, historically around 0.15 – 0.2 % of GDP is low by international standards. It is not sufficient for the expected growth in research and development, inclusive of agricultural research.

Although the National Agricultural Research System of Sri Lanka has been developed to sufficient capacity, it has not performed well and a decline in quality is observed. Motivation and the commitment of the research institutions which determine the effectiveness of the NARS are insufficient and the research environment of the most of the institutions remains below the international standards. Consequently the impact of the research at farm level is insignificant in the face of challenging demands of the agricultural sector.

The research policies should complement the overall goals and objectives of the National Agricultural Policy of Sri Lanka and reinforce and fill the gaps in Research & Development which are constraints of the enhanced agricultural production.

Public and private sectors have to play an active role focusing on agricultural research and technology development. This will be a formidable challenge for all of us and requires appropriate policy and programme interventions to mobilize human, physical and financial

resources. On this ground, increase of the GERD up to 1.5% of the GDP would be beneficial to achieve targets.

Ministry of Finance and Planning of Sri Lanka has allocated research funds for year 2011 on the basis of the National Agricultural Research Plan 2011 prepared by SLCARP: The Ministry allocated total sum of Rs. 463 million, inclusive of Rs. 50 million on the institutions under Department of Agriculture, Rs. 06 million on the Department of Export Agriculture and Rs. 20 million on the National Universities for the priority agricultural research programmes/ projects to be conducted by all relevant institutions.

4. National Agricultural Research System (NARS) of Sri Lanka

Constituents of the NARS

The constituent members of National Agricultural Research System (NARS) are distributed among 10 Ministries. National Agricultural Research System (NARS) of Sri Lanka consists Research Institutes/ Departments that operate under these Ministries. Agriculture/ Livestock/ Veterinary/ Fisheries other Faculties of the national universities are also involved in agricultural research, mainly in collaboration with NARS. The Sri Lanka Council for Agricultural Research Policy (SLCARP) is functioning in the NARS as the Central Body, coordinating NARS institutions among each other and with the Government.

The National Agricultural Research System (NARS) comprises for sub-sectoral agricultural activities, which may be identified as:

- Crop production
- Fisheries and Aquatic resources development
- Livestock development
- Conservation and sustainable use of natural forests.

Crop Production

1. Ministry of Agriculture

Department of Agriculture

- Horticultural Crops Research and Development Institute (HORDI)
 - Regional Agricultural Research & Development Centre (RARDC) - Bandarawela

- Regional Agricultural Research & Development Centre (RARDC) – Makandura
 - Fruit Crops Research and Development Centre (FCRDC) Horana
 - Plant Virus Indexing Centre (PVIC), Homagama
 - Agricultural Research Station (ARS) - Sitha Eliya
 - Agricultural Research Station (ARS) - Girandurukotte
 - Agricultural Research Station (ARS) - Thelijawala
 - Food Research Unit (FRU)
- Field Crops Research and Development Institute (FCRDI)
 - Grain Legume and Oil Seed Research & Development Centre (GLORDC)
 - Regional Agricultural Research & Development Centre (RARDC) – Aralaganvila
 - Regional Agricultural Research & Development Centre (RARDC)- Kilinochchi
- Rice Research and Development Institute (RRDI)
 - Regional Agricultural Research & Development Centre (RARDC) - Bombuwela
 - Rice Research Station (RRS) Ambalantota
 - Rice Research Station (RRS) Samantturai
 - Research Station (RS) – Labuduwa
 - Research Station (RS) – Bentota
 - Research Station (RS) – Murungan
 - Research Station (RS) – Paranthan
- Plant Genetic Resources Centre (PGRC)
- Socio-Economics and Planning Centre (SEPC)
- Seed Certification and Plant Protection Centre (SCPPC)
- National Plant Quarantine Service (NPQS)
- Farm mechanization Research Centre (FMRC)
- Natural Resources Management Centre (NMRC)

Hector Kobbekaduwa Agrarian Research & Training Institute (HARTI)

Institute of Post Harvest Technology (IPHT)

Sri Lanka Council for Agricultural Research Policy (SLCARP)

2. Ministry of Minor Export Crop Promotion

Sugarcane Research Institute (SRI)

Sri Lanka Cashew Corporation

Department of Export Agriculture (DEA)

- Cinnamon Research Station – Palolpitiya
- Kundasale Research Unit
- Nilambe Research Station
- Delpitiya Research Station
- Intercropping and Betel Research Station - Narammala
- Tissue Culture Laboratory and Plant Production Nursery - Walpita

3. Ministry of Economic Development

Department of National Botanic Gardens

4. Ministry of Plantation Industries

Tea Research Institute (TRI)

Rubber Research Institute (RRI)

5. Ministry of Coconut Development and Janatha Estate Development

Coconut Research Institute (CRI)

6. Ministry of Traditional Industries and Small Enterprise Development

Palmyrah Development Board

Fisheries & Aquatic Resources Development
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7. Ministry of Fisheries and Aquatic Resources

National Aquatic Resources Research and Development Agency (NARA)

Livestock Development

8. Ministry Livestock Resources and Rural Community Development

Department of Animal Production & Health (DAPH)

Veterinary Research Institute (VRI)

Conservation and Sustainable Use of Natural Forests.

9. Ministry of Environment

Forestry Research Unit of the Forest Department (FRD)

10. Ministry of Higher Education

National Universities

University of Peradeniya

- Faculty of Agriculture
- Faculty of Veterinary Medicine and Animal Science

University of Ruhuna

- Faculty of Agriculture
- Faculty of Fisheries and Marine Sciences and Technology

Rajarata University

- Faculty of Agriculture

Sabaragamuwa University

- Faculty of Agricultural Sciences

Wayamba University

- Faculty of Agriculture and Plantation Management
- Faculty of Livestock, Fisheries and Nutrition

Eastern University

- Faculty of Agriculture

Uva-Wellassa University

- Faculty of Animal Science and Export Agriculture

University of Jaffna

- Faculty of Agriculture

5. Sri Lanka Council for Agricultural Research Policy (SLCARP) and its role in the National Agricultural Research System (NARS) of Sri Lanka

Sri Lanka Council for Agricultural Research Policy (SLCARP) that operates within the Ministry of Agriculture is the umbrella organization for the National Agricultural Research System (NARS) of Sri Lanka. SLCARP was established under the Act. 47 of 1987 to create an environment for more coordinated and more productive agricultural research.

A vibrant and sustainable agricultural research and innovation system, assuring socio-economic development of Sri Lanka is the vision of SLCARP. The mission of SLCARP is to ensure agricultural research and innovation, directed towards national development goals through policy formulation, facilitation, coordination and monitoring.

With the Secretariat in Colombo, SLCARP serves as an organization in an advisory capacity for coordinating and consolidating research efforts within the NARS, funding research programmes/ projects and promoting scientific research linkages in prioritized areas both nationally and internationally. SLCARP has been instrumental in promoting and facilitating research, by improving and enhancing agricultural research through documentation and communicating latest advances in research to the NARS scientists. SLCARP has identified its own perspective, plans and programmes for the future in keeping with the aspirations and national goals proclaimed in Mahinda Chinthana – Vision for the future to meet the future challenges in achieving food security and reducing poverty.

The main mechanism of functions of SLCARP appears as National/ Standing Committees in major thrust areas of agricultural research/

various agricultural research management activities. These Committees are functioning under the Council of SLCARP. Specialists in the selected sub-sectors of agricultural research and representatives of all the institutions involved in research and development in the sub-sector are members of these Committees.

6. Priority Setting and Strategic Planning in Agriculture

The need to identify priorities in research thrust areas in agriculture will be important for investment and expected achievements in research. This is of particular importance as the human and financial as well as infrastructure facilities in the NARS are limiting. In setting priorities national requirements such as contributions to economic development, food security, export earnings, foreign exchange savings, poverty reduction, employment generation and natural resources conservation should be considered. The research priorities are often dictated by market demand; hence stakeholder consultation is required to have a correct mix of national needs and market demand.

Prioritization in agricultural research should be handled with emphasis on natural resources management, processing technology, value addition, agro-industry and marketing across the production – consumption continuum for generation of appropriate technologies by maximizing benefits on investment. The emphasis should specially be on areas of current importance such as crop improvement and breeding using modern Biotechnology, hybrid seed production, livestock improvement, resource conservation/ improvement, food technology, post harvest processing and value addition, labour and energy saving measures, water conservation and waste management etc.

Accordingly, all the National Agricultural Research Institutions inclusive of the Agricultural/ Livestock/ Veterinary/ Fisheries Faculties of the National Universities plan their Research in these priority areas for a defined period.

Ministry of Agriculture and other related Ministries prepare and have the Policy pertaining to their subject and functional area. The policies of all relevant Ministries are based on National Priorities outlined in the Government Development Policy Framework for a particular time period.

Ministry of Agriculture and other related Ministries have defined their Policies in accordance with the present Government Development

Policy Framework – **Mahinda Chinthana** - Vision for the Future, A Ten year Horizon Development Frame Work, 2006-2016.

All Research Institutions under certain Ministry are to prioritize their research in accordance with the Policy of their line Ministry. These Institutions should prioritize their research with stakeholder participation to orient research to end-user needs and development goals and to maximize benefits on resource utilization.

These prioritized research programmes should be organized into Research Programmes under the particular Division/ Section of the respective institution. The appropriate budgets of the programmes are to be determined. Expected output of the research and the implementation procedures are to be well defined. This will be the Research Plan of the particular institution.

All these plans which are components of the one consolidated plan will be indicated as the research programmes under major thrust areas of agriculture as per Government Policy Framework in Agriculture. This will be the National Agricultural Research Plan of the country.

7. National Agricultural Research Plan (NARP)

The National Agricultural Research Plan (NARP) is a consolidated action plan for scientific research in agriculture. It sets out the research agenda of the major thrust areas in agriculture. The research plan sets out in summary from the key elements of scientific work to be carried out in a short to medium term (3 years) time frame commencing in 2011. It may however, be subjected to amendments, depending on exigencies and expediency of the State and its public beneficiaries in realizing the expected targets.

NARP has been evolved through a consultative and a participatory dialogue in which all those who matter in agricultural development, production and research have been involved. In terms of achievements, the plan will strive to reach the expected goals of a viable and sustainable system of agricultural production that would ensure nutrition, food security and socio-economic progress of the people of Sri Lanka. By the year 2016, in terms of accountability, NARS will attempt to provide evidence that within the limitations of any possible resource constraints, the investments in research have been justifiably utilized, and the following objectives, which have been set by Mahinda chinthana – vision for the future have been achieved:

- a) The growth in domestic food production exceeds the growth in population due to varietal improvements of food crops and livestock and better management of diseases and pests.
- b) The quality, variety and quantity of food has increased to step up the daily per capita supply of proteins and energy.
- c) Imports of food products such as milk food, processed fish and meat products as well as other essential foods have declined due to enhanced domestic production.
- d) The agriculture sector, as a whole sustains as appreciable growth level, and continues to retain its status in the sectoral contribution to the Gross Domestic Production.
- e) Crop losses at pre-harvest, post-harvest, packaging and transporting stages have been reduced appreciably to acceptable norms.
- f) An increase in farm incomes has been achieved as a result of higher productivity, reduced costs of production and the use of innovative devices of integrated farming systems.
- g) Increase in competitiveness of products and production systems in commercial crops have enabled export products to face the challenges posed by deregulated trade in international markets.

8. Major Thrust areas in Agricultural Research

National Agricultural Research Plan 2011-2013 has been set in accordance with the priority areas identified in the Mahinda chintana- The Vision for the Future. These areas are:

- Natural Resources Management
- Plant Breeding
- Agricultural Biotechnology
- Plant Protection
- Agricultural Machinery and Equipment
- Post Harvest Technology and Value Addition
- Floriculture Research and Development
- Organic Agriculture and Agro Forestry
- Socio-Economics and Policy Analysis
- Livestock, Aquaculture and Fisheries

9. Priorities of Major Thrust Areas of Agricultural Research

Plant Breeding

- i. **Plant genetic resource management and utilization**
Preservation of natural genetic variation and introduction of genetic variation from other countries are important for future development of crop plant varieties.
- ii. **Productivity enhancement through genetic improvement**
Genetic manipulation for productivity enhancement increases the yield of the crops in most economical way. Increases in potential yield through genetic improvement and reducing the gap between potential yield and realized yield at farmer level by stabilizing yield can consider for this purpose. The latter approach is successful improving adaptability and stability of the varieties and incorporating tolerance/ resistance for biotic and abiotic stresses.
- iii. **Quality improvement to meet the requirements of the end-users**
At present the end users are more concerned about the quality of the product. Therefore there is a demand for different quality attributes depending on the crop. It is further lead to fetch the higher price for the end product which is leading for higher income.
- iv. **Increasing the availability of high-quality basic seed and planting materials**
The quality planting materials are important for getting higher and sustainable yield. Hence availability of quality planting materials is important.

In addition to above priorities following specific priorities were identified for Rice and Forest crops.

Rice:

- Development of rice varieties suitable for unfavourable conditions of irrigated and rain-fed cultivation.

Forest crops:

- Domestication of potential native species for timber and other forest products
- Improvement of bio fuel tree species: *Jatropha* and *Gliricidia*

National Priorities in Plant Breeding Research 2011-2016 published by Sri Lanka Council for Agricultural Research Policy, 2011.

Agricultural Biotechnology

1. PLANTATION CROPS

1. Productivity improvement of plantation crops through biotechnology.
2. Production of quality planting material
3. Improvement of production of bio-fuels from *Jatropha* and by-products of sugarcane, respectively.

2. FOOD CROPS

1. Productivity improvement of food crops through biotechnology
2. Development of improved rice varieties that are resistant to abiotic and biotic stresses
3. Production of quality planting materials
4. Improvement of the quality of agricultural products (nutritional, etc)
5. Productivity improvement
6. Development of disease diagnostic tools
7. Conservation of endangered crop wild relatives

3. EXPORT AGRICULTURAL CROPS

1. Productivity improvement of export agricultural crops through biotechnology.
2. Production of quality planting material.
3. Quality improvement of export agricultural products through biotechnology

4. LIVESTOCK, POULTRY AND FISHERIES

A) Livestock and Poultry

1. Improvement of production of milk and milk products: cattle, buffalo and goat
2. Improvement and development of vaccines for bacterial, viral and parasitic infections using molecular techniques
3. Improvement of nutrient availability of animal feeds through manipulation of rumen and gut micro-flora
4. Enhancement of nutrient availability of locally available animal feed resources by using molecular techniques

B) Fisheries

1. Improvement of production and processing of inland and marine fish: (1) carp; (2) tilapia; (3) *Channa striatus*; (4) *Macrobrachium rosenbergii* (fresh water prawn); (5) *Penaeus monodon* (brackish water prawn); and (6) milkfish (brackish water fish)
2. Development of resistant brood stock of prawns (*Penaeus monodon*) for white spot disease using molecular markers.
3. Marker assisted selection for high growth rate of fresh water fish and prawn brood stock

5. OTHER

1. Addressing regulatory issues such as formulation of biosafety framework enabling the related research for crops and animals.
2. Enhancing the use of microorganisms and their products either for direct consumption as food, or in agro-industries for enhanced agricultural production.

National Priorities in Agricultural Biotechnology Research 2011-2016 published by Sri Lanka Council for Agricultural Research Policy, 2011.

Plant Protection

This thrust areas in Plant Protection research has been identified under Plant Pathology, Agricultural Entomology, Nematology and Weed Science for the period of 2011-2013.

Research Priorities in Plant Pathology and Agricultural Entamology

A.) CEREAL CROPS

1. Management of bacterial blight disease in rice with emphasis on
 - Identification of resistant varieties.
 - Identification of resistant genes and incorporation into new varieties.
2. Management of grain discoloration of rice with emphasis on
 - Studies on grain discoloration and sterility in relation/with reference to different cultivation methods and different environment conditions.

- Screening of fungicides for effective application with minimum MRLs.
3. Integrated Management of sheath blight (*Rhizoctonia solani*) of rice with special emphasis for biological, agronomic, chemical methods and plant extract based bio pesticides.
 4. Management of rice blast disease with special emphasis on
 - Identification of resistant genes and incorporation into new varieties.
 - Studies on disease management under different agronomic management methods and environmental conditions.
 - Screening of suitable, environmentally friendly fungicides.
 5. Management of *Aspergillus* ear rot and aflatoxin production in maize with special emphasis on
 - Identification of different isolates of *Aspergillus* sp.
 - Selection of resistant varieties for *Aspergillus* sp. and aflatoxin production.
 - Studies on storage conditions on growth of *Aspergillus* sp.
 - Awareness programs to mobilize them to adopt improved post harvest technological practices to minimize the aflatoxin contaminations.

B.) FIELD CROPS

Narrow leaf disorder of chilli (NLD)

- Identification of causal agent using molecular detection techniques
- Efficacy of cultural practices in reducing NLD.

Management of leaf curl virus (CLCV) in chilli with special emphasis on

- Selection of resistant varieties for CLCV
- Efficacy of cultural practices in reducing CLCV

Management of virus disease in grain legumes.

- Selection of resistant varieties for virus diseases.
- Acquisition of resistant varieties from other countries.
- Efficacy of maize intercropping with mung bean in reducing virus diseases

Management of purple blotch and Anthracnose of onion through

- Selection of resistant varieties for purple blotch.
- Screening of fungicides.

C.) HORTICULTURAL CROPS

Vegetable, Root & Tuber Crops:

1. Management of Anthracnose sp. in vegetables, fruits and field crops with special emphasis on
 - Selection of resistant varieties for anthracnose
 - Screening fungicides for anthracnose
 - Cultural practices
2. Management of bacterial wilt of tomato, capsicum, potato, ginger, turmeric, brinjal, gotukola and *Fusarium* wilt of tomato through
 - Identification of resistant varieties,
 - Incorporation of organic matter and
 - Use of bio control agents
 - Introduction of IPM practices
3. Management of virus diseases in grain legumes
 - Selection of resistant varieties for virus diseases
 - Acquisition of resistant varieties from other countries
 - Efficacy of cultural practices in reducing virus diseases
4. Management of collar rot disease in legumes
 - Changes of soil chemicals / physical properties
 - Incorporation of organic amendments
 - Use of bio-control agents
5. Improvement of farmer adaptation of the available management package on club root disease of cabbage
6. Management of virus diseases of vegetables (okra, beans, tomato and cucurbits)
 - Development of resistant varieties.
 - Use of bio-control.
 - Barrier crop cultivation and other cultural practices
 - Vector control
 - Introduction of new viruses and development of IPM
7. Management of powdery mildew of vegetables
 - Development of resistant varieties
 - Use of bio-control
 - Use of chemical control
8. Development of bio control system to manage root, collar, tuber and rhizome fungal rot diseases by
 - Screening and formulation of biocontrol agents assessing their field performances, and application technology,
 - Screening fungicides and resistant varieties.

9. Management of diseases in controlled environment
 - Resistant varieties
 - Bio-control agents
 - Screening of fungicides
 - Use of botanicals
10. Management of blight and viral disease of potato and tomato via identification of A1, A2 type in Phytophthora blight, variety resistance, chemical screening and disease forecasting models
11. Management of leaf diseases of vegetables (potato, tomato, capsicum, ginger, leafy vegetables)
 - Development of resistant varieties
 - Screening of fungicides and botanicals
 - Incorporation of organic matters and cultural practices

Fruits:

1. Development of a management system for die-back of jack and other perennial fruit crops.
2. Management of fruit rot diseases of underutilized fruit crops (Durian, Cherimoya and Uguressa) through
 - Tree management systems.
 - Identification of casual organisms and factors affecting disease development.
 - Use of botanicals
 - Selection of suitable fungicides.
 - Application time and methods of chemicals
3. Management of root diseases of Guava, Citrus with special emphasis on
 - Screening fungicides
 - Incorporation of organic matter and changes of soil chemical and physical properties.
 - Use of bio-control agent
 - Resistant rootstocks
4. Management of Panama Disease of banana
 - Selection of resistant clones
 - Use of cultural and bio-control methods
 - Integrated Pest Management
5. Management of powdery mildew of Rambutan
 - Screening of fungicides, time of application
 - Testing of botanical oils
 - Cultural control

6. Management of virus diseases of banana
 - Production of virus free planting material
 - Methods on virus diagnosis
 - Other cultural methods
7. Management of Papaya ring spot virus
 - Development of resistant/tolerant varieties
 - Cultural methods and nutrient management
8. Management of virus bacterial canker and greening disease of citrus
 - Production of disease free mother plants/ planting materials
 - Development of resistance varieties
 - Cultural control
9. Management of pineapple wilt virus
 - Production of virus free planting material
 - Methods on virus diagnosis
 - Other cultural methods
 - Vector control
10. Management of nursery diseases of fruit crops
 - Suitable potting media
 - Screening of fungicides
 - Bio-control
 - Cultural control

Ornamentals & Foliage Plants:

1. Management of Anthurium Bacterial Blight
 - Screening of varieties against Anthurium bacterial blight and induction of resistance.
 - Development of cultural control package to manage Anthurium bacterial blight.
 - Use botanicals and microbial bio control agents to manage *Xanthomonas* bacteria.
2. Management of diseases of cut flower varieties
 - Identification of suitable environment conditions for disease incidents.
 - Development of a disease management package for poly tunnels
 - Identification of causal organisms of each important disease and pesticide recommendation.
 - Development of prediction system for disease and pesticide recommendation

- Development of prediction system for disease management.
3. Management of leaf spot and leaf blight of cut foliage varieties (especially in palm varieties).
 - Development of cultural and diseases management packages.
 - Identification of least toxic chemicals to manage cut foliage diseases.
 - Development of methods to minimize post-harvest diseases of cut foliage.
 4. Management of stem rot disease of *Polyscias* with special emphasis for plant extract based bio pesticides
 - Development of cultural and diseases management packages.
 - Identification of least toxic chemicals to manage cut foliage diseases.
 - Development of methods to minimize post-harvest diseases of cut foliage.

Spice Crops

1. Management of pepper yellow mottle virus of black pepper using IPM through
 - Screening mother vines by molecular techniques and rouging infected plants at the time of deletions.
 - Identification of field resistant plants and testing them by PCR.
 - Isolating entomopathogenic fungi, testing them in laboratory/field and preparation of formulations.
2. Management of cocoa swollen shoot virus spread by adopting molecular techniques for indexing affected planting material.
3. Integrated Management of leaf fall of nutmeg, pepper slow wilt, cinnamon rough bark, clove leaf spot and cocoa pod rot
4. Identification of causal agents and Integrated Management of yellowing condition of pepper
5. Management of bacterial leaf blight of betel through
 - Screening of local betel cultivars for resistance
 - Induction of variation and selection for resistance
 - Development of cultural control practices

- Development of environmentally friendly chemical control methods.
 - Use of plant extracts for the control of bacteria.
6. Integrated Management of sudden death of nutmeg trees.
 7. Integrated Management of nursery diseases of export agriculture crops.

Post-Harvest Management

1. Prevention of post harvest infection of EAC products by pathogens through pre-treatment and proper storage/packing systems
2. Control of post harvest diseases of fruits and vegetables using GRAS chemicals.
3. Management of post-harvest diseases of fruits.
 - Pre-harvest disease management
 - Post-harvest treatments (hot water, edible wax).

Plantation Crops

Tea:

1. Development of high yielding tea cultivar with resistance to blister blight, and stem and branch canker through screening of
 - High productive biotics from the old seedling tea fields
 - Progenies coming from the plant breeding programme.
2. Biological control of tea diseases using local isolates, their multiplication and introduction.
3. Screening of more environmentally friendly fungicides for the inclusion in Integrated Disease Management packages of major tea diseases.
4. Molecular diagnosis of canker causing fungi in tea.
 - DNA phylogeny, morphology and pathogenicity of *Macrophoma theicola* (causal agent of stem canker disease of tea)

Sugarcane:

1. Management of Phytoplasma disease of Sugarcane
 - Develop artificial inoculation techniques to screen varieties for phytoplasma resistance.
 - Develop artificial inoculation techniques to screen varieties for vector resistance.
 - Introduce 3 tire (stage) nursery systems to supply healthy seed cane.

Rubber:

1. Management of white root disease of rubber
 - Screening of pesticides
 - development of new application technologies
 - Development of biological control methods
2. Management of *Corynespora* leaf fall disease of rubber
 - Screening of clones
 - Studies on the epidemiology
 - Screening of fungicides to manage the disease

Coconut:

1. Management of weligama coconut leaf wilt disease.
 - Develop a readily diagnostic method for identification of diseased palms
 - Determine vectors transmitting the disease and develop management strategies for those insects
 - Develop tolerant / resistant varieties to the disease
 - Determine spread pattern of the disease
 - Determine effect of the disease
2. Integrated management of crown, stem and bole disease coconut.
 - Screening of new fungicides
3. Investigations of diseases / Disorders of unknown etiology
 - Identify cause(s) for leaf scorch decline, rapid decline and premature decline
 - Develop management methods

Nuts:

1. Identification of causative agents and associated factors in the development of inflorescence die-back of cashew.

FOREST TREES

1. Control of die-back of teak

OTHERS

1. Management of diseases in protected agriculture
2. Elimination of non-target effects of agro-chemical
3. Management of post harvest diseases of fruits and vegetables
4. Contamination of agro-products

National Priorities on Agricultural Entomology and Nematology

1. Establishment of National Reference Collection and Pest Identification Service
 - Establishment of a national identification unit.
 - Maintenance of identification keys.
 - Development of necessary human resources through training and scholarships.
2. Assessment of Pest Damages
 - Carrying out a national survey of pest problems of crops.
 - Development of practical pest forecasting and surveillance methods
3. Prevention of Introduction of New Pests
 - Inclusion of exotic pests of quarantine importance in the reference collection.
 - Development of pest eradication methods.
 - Establishment of pest risk analysis methods.
4. Utilization of Biological and Non Chemical control Methods in Pest Management.
 - Biological control of pest management should be facilitated by CARP to the NARS and made mandatory.
 - Evaluation of indigenous natural enemies of pests like thrips, mites, whiteflies leaf miners and leafhoppers where no previous studies have been carried out.
 - Mass of natural enemies for commercial use in pest management programs.
 - Facilitation of mass culture and formulation of microbial pesticides for commercial application.
 - Establishment of a central biocontrol facility for sustainability of these programs.
 - Training of technical personnel to undertake these activities.
5. Judicious use of Chemical Pesticides.
 - Regularizing and monitoring of pesticide application.
 - Expansion of pesticide residue analysis facility at ROP as a national center for residue analysis

- Expansion of pesticide monitoring programmes in relation with the safety of natural enemy complex and pollinators in the crop ecosystem.
 - Training of personnel involved with pesticide usage on correct application techniques.
 - Chemical control with special reference to pesticide residue monitoring, laboratory standards and agricultural product quality
 - Monitoring the pesticide resistance development of field populations of pests.
6. Establishment of Breeding and Cultivation of Resistant Varieties of Crops
- Acquisition of new genetic material for improvement of crop varieties.
 - Carrying out awareness programs among growers on management of resistant varieties
 - Identification of landraces showing resistance to pests.
 - Use of Molecular Biology Techniques in Plant Protection Research
 - Studies on Management of Nematodes
 - Studies on Agricultural Biodiversity with respect to natural pest management

National Research Priorities in Weed Science

Integrated Weed Management (IWM) strategies for lowland paddy, vegetables, and upland agricultural crops, with special reference to weeds of national significance in the relevant sector.

Evaluation of new herbicides for rice, other field crops and Plantation Crops.

Area specific systematic monitoring of weed flora.

Control and management of noxious weeds in wastelands and aquatic habitats inclusive of irrigation canals eg: *Salvinia molesta*, *Eichhornia crassipes*, *Mimosa pigra* and *Parthenium hysterophorus*.

Development of low cost weed management systems for rubber and coconut Lands, tea, sugarcane plantations, with special reference to areas in the relevant sector

Effect of weeds and weed control measures on cinnamon

Development of weed management techniques using allelopathic properties of crops

Management of environmental effects of herbicide-resistant weeds and reduced effect of herbicides.

Integrated (crops and animal) farming approach for weed management in mixed gardens and smallholder sector in wet and intermediate zones.

National Priorities in Plant Protection Research 2011-2013 published by Sri Lanka Council for Agricultural Research Policy, 2011.

Post Harvest Technology and Value Addition
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Fruits and vegetables

1 Quality management and prevention of losses in marketing channels of fruits and vegetables and value addition activities for income generation at regional level.

2 Networking: To establish sustainable marketing and technical information networks among growers, researchers, consumers and producers and encourage investment for the sector

3 Enhance national level research and development programs for the post-harvest sector to address technological gaps mainly focusing on the following aspects,

- pre-harvest treatment,
- identification of harvest indices,
- post-harvest handling of fresh produce and the application of post-harvest treatments,
- user-friendly and cost- effective packaging,
- appropriate transportation and storage methods ,
- introduction of value added products, and product formulation and
- dehydration and processing to assure quality and storability.

4 Capacity building in the sector to drive economic opportunities and entrepreneurship.

5 Expand the value addition capacities and volumes at provincial/national level.

- 6** Develop national level post-harvest infrastructure facilities for agricultural development and minimizing energy costs.
- 7** Adopt national and international quality standards and safety protocols for important fresh and processed products.
- 8** Providing technological and logistic support to start processing industries.
- 9** Introduce information technology/databases in the following areas;
 - Farmer information and market information
 - Technology and service providers information
 - Customer information

Grains and Oil seeds

- 1** Grain processing to be further enhanced through provision of locally installed grain drying/storage facilities.
- 2** Provide pre-cleaners and pre-dryers (or mobile units) and enhanced field transportation services as part of a network of purchasing stations.
- 3** Develop the capability of processing plants to receive wet grain during unexpected rains with special attention to post harvest operations under severe weather conditions.
- 4** Optimize profitability through improving dryer capacity of different processors for enhanced grain drying.
- 5** Examine appropriate alternative energy sources for agro-processing.
- 6** Develop capacity to accept varying volumes of incoming wet grain through the introduction of modular drying plants.
- 7** Develop drying systems suitable for different types of grain with the use of adaptive trials and tests.
- 8** Emphasize loss prevention and quality improvement of processed products through capacity building/extension services for millers, collectors and farmers in line with prioritised national goals.
- 9** Be aware of consumer preferences, demand, purchasing power and other similar factors through systematic and periodic data collection activities.

Spice crops

- 1 Value addition research in export agricultural crops.
- 2 Upgrading the regulatory framework for processing and value addition.
- 3 Enhancing the export market and establishment of market information systems.
- 4 Expanding the technology extension programmes and establish technical information networks under public-private partnership.
- 5 Developing national brands and standards for the spice sector.

Fisheries sector

- 1 Minimize post-harvest fish losses.
- 2 Enhancement of fish postharvest quality management systems.
- 3 Preservation, food safety and quality control research.
- 4 Fish by product utilization and waste management.

National Priorities in Post Harvest and Value Addition Research in Agriculture 2011-2015 published by Sri Lanka Council for Agricultural Research Policy, 2011.

Floriculture Research and Development
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1. **Identification /improvement/ production of novel ornamental plants and cut flowers to the industry**
 - a. Usage of genetic modification, genetic improvements of cut foliage, cut flowers fillers, dried items
 - b. Marketing research to identify potential of the industry
2. **Mass propagation of quality planting materials**
 - a. Use of tissue culture methods for plant propagation could be researched with emphasis on cost of production
 - b. Mass propagation housing structure (low electricity usage)

3. Developing new crop management and production techniques

- a. Introduction of new growing media
- b. Identification fertilizer applications to get maximum production from unit area
- c. Production under protected environment, CO₂ enrichment etc.

4. Post harvest technologies to improve vase life of the products

- a. Value addition of the products
- b. Incensement of vase life of the products
- c. Dry flower production

5. Pests and diseases control methods

- a. Usage Integrated Pest Management (IPM) methods for floriculture sector
- b. Management of Bacterial Blight
 - Screening of varieties against bacterial blight and indication of resistance
 - Development cultural control package to manage Anthurium bacterial blight
 - Use botanicals and microbial bio control agents to manage Xanthomonas bacteria
- c. Management of pest and diseases of cut flower varieties
 - Identification of sustainable environment conditions for diseases incidents
 - Development of a disease management package for poly tunnels
 - identification of causal organism of each important disease and pesticide recommendation
 - development of prediction system for disease and pesticide recommendation
 - development of prediction system for disease management
- d. Managements of leaf spot and leaf blight of cut foliage varieties (specially in palm varieties)
 - Development of cultural and disease management packages
 - Identification of least toxic chemicals to manage cut foliage disease
 - Development of methods to minimize post harvest diseases of cut foliage.

6. Development of sustainable cost effective cultivation methods for different agro ecological zones.

- Designing and construction of green houses, net houses for low cost less use of electricity
- Construction of net houses and propagator houses
- Irrigation methods and water harvesting methods
- Water requirements for floriculture plants

7. Development of cut flower and foliage industry as micro enterprises to upgrade the income of the housewives.

- Feasibility of anthurium, orchid and gerbera cultivation
- Feasibility of popular cut foliage.

National Priorities in Floriculture Research 2012-2016 published by Sri Lanka Council for Agricultural Research Policy, 2011.

Socio Economics and Policy Analysis
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1. Competitiveness in Agriculture

Plantation Crops Sector

Coconut

Shortage of labour

Increasing the income for unit of land/ efficiency

Adoption of new technologies.

Tea

High cost of green leaf production in the smallholder sector

Increasing productivity in terms of land area

Rubber

Shortage of labour

Increasing the income for unit of land/increase efficiency

Sugarcane

Labour shortage for harvesting

Food Crops Sector

Trade liberalization, the local food crop sector (Rice and subsidiary crops), has been under tremendous pressure, due to importation of cheaper food from the neighboring countries

The impact of socio economic factors on adoption of new technology in the food crop sector

New farming systems for value added agriculture.

Horticultural Sector

The potential to meet the demands of the niche markets within the country or globally, of value added products, especially vegetables, fruits and flowers and organic foods.

Post-harvest losses.

Export Agricultural Crops

Social stigma attached to cinnamon peeling, resulting increasing cost of production

Limited labour involvements in processing of export agricultural products

Floriculture Sector

Meeting the ever increasing demand for cut flowers, foliage plants, bulbs, corms and tubers

Organic Agriculture

Absence of a National Organic Agriculture standards and policy inhibits exploiting global niche markets for these products.

Livestock Sector

High prices of imported animal feeds and lack of quality fodder and livestock feed within the country

2. Natural Resource Management and Environmental Sustainability

- Changes of land use patterns
- Problems in common property resources
- Carbon dioxide absorption and sinks
- Sustainable utilization of grasslands and forest cover
- Wildlife
- Impacts of changing agricultural policies including trade policies on environment
- Biodiversity: Loss of germ plasm
- Green House Gas (GHG) emissions
- Sustainability and uncertainty of agricultural systems and practices
- Livestock, agriculture and environment interactions and associated socio-economic implications
- Developing agri-environment indicators
- Use of traditional knowledge for environment friendly farming (nature farming)

3. Technology Generation, Transfer and Related Services

- Effectiveness in agricultural research and extension
- Establishment of national priorities and for paddy and other food crops
- Strengthening input delivery system for supply of quality inputs
- Strengthening research and development of agriculture
- Institutionalizing a farmer-friendly agricultural lending system and risk management
- Supporting new entrepreneurship in agriculture
- Strengthen institutional collaboration
- Resource conservation and sustainability
- Profitable cropping systems

4. Agricultural Inputs, Marketing, Processing and Value Addition

- High marketing margins of fruits and vegetables
- High post harvest losses of fruit and vegetables
- Lack of competition in rice milling industry
- Evaluation of packaging and transportation of fruits and vegetables
- Poor adoption of forward trading
- Lack of understanding of consumer behavior
- Slow growth in agro-based industries
- Failure of price stabilization
- Trade barriers in agricultural exports
- Slow growth in supermarket chain
- Lack of understanding of market behavior
- Slow growth of other food crops sector (OFC)
- Lack of understanding of export markets for agricultural produce
- Impact of subsidies on domestic agriculture
- Fragmented food marketing system
- Inefficiency of marketing of livestock products
- Lack of understanding of information needs of the farmers
- Effectiveness of Economic Centers
- Disincentive of trade policies for agricultural development
- Changing food price and food security at the household level
- Changing food habits and implications

5. Agricultural Trade

- Trade policy (tariff and non-tariff measures)
- Institutional changes related with trade
- Exchange rate change and trade
- Impact of macroeconomic policies
- Value chain management
- Effectiveness of trade related services

6. Employment, Labor Use, Institutions and Rural Development

Agrarian Societies, its Structure and Interrelations

- Food insecurity and poverty in agrarian economies
- Land tenure and related issues
- Emerging Labour shortages in rural sector
- Rural credit market and farmer supporting services
- Gender and rural development

Agrarian Transformation

- Transition of agrarian economy
- Transformation processes and its impact on agrarian economy
- Land parceling
 - Devolution of power on regional agriculture development
 - Diversification of rural economy

Agrarian Reforms and Policies

- Land reforms and water policy
- Rural development projects

National Priorities in Socio-Economic Research in Agriculture 2012-2016
published by Sri Lanka Council for Agricultural Research Policy, 2011.

Livestock, Aquaculture and Fisheries

1. Animal Breeding and Reproduction

- Assessing the Current Status of Animal Genetic Resources (AnGR) and Improving Existing Genotypes
- Applying Existing Technologies for Enhancing Performance and Fertility
- Developing and Validating New Tools and Techniques

2. Animal Nutrition

- Policy Initiatives
- Development and Utilization of Forage Resources
- Optimizing the Use of Rice By-products and Maize in Sri Lanka
- Development of Novel Concentrate Feedstuffs from Local Materials

3. Animal Health

- Establish/develop novel (a). techniques to facilitate rapid and early detection of pathogens; and (b). products to prevent and control infectious diseases in animals.

- Establish methods to detect, analyse and respond to zoonotic and emerging diseases.
- Improve the knowledge on (a). the genetic variations, virulence, antimicrobial resistance of pathogens; and (b). genetic basis of disease resistance in the host
- Field epidemiological studies on endemic and emerging diseases
- Improve veterinary practices to ensure food safety and thereafter, quality assurance that will increase food security and enhance trade and exports
- Adopt quality control aspects of pharmaceutical agents to ensure economical and effective treatment plans

4. Fisheries and Aquaculture

- Coastal and Offshore Fisheries
- Inland Fisheries
- Aquaculture
- Post Harvest Technology and Marketing
- Coastal Ecosystems

5. Animal Products, Processing, Economics and Marketing

- Dairy Processing
- Meat Processing
- Poultry Meat Processing
- Economics and Marketing of Animal Products
- Quality and Safety of Animal Products
- Egg Quality
- By Product Utilization and Waste Management

6. Farming Systems

- Characterization and Improvement of Agricultural Production Systems
- Livestock and Fish Production Systems
- Management and Conservation of Indigenous Plants, Livestock and Fish Resources
- Policy and Legal Aspects

7. Animal (Livestock) Welfare

- Welfare of Animals during Transportation (Cattle, Buffalo, Poultry and Pigs)
- Welfare of Animals during Slaughtering

National Priorities in Livestock, Aquaculture and Fisheries Research 2012-2016 published by Sri Lanka Council for Agricultural Research Policy, 2011.

10. Limitations

Institutions in Sri Lanka, which are conducting agricultural and agriculture related research submitted the research programmes/projects to be included in NARP 2012 for obtaining of the funds from Ministry of Finance and Planning.

Coconut Research Institute of Sri Lanka, Sugarcane Research Institute of Sri Lanka, National Aquatic Resources Research and Development Agency and Palmyrah Development Board did not submit such research programmes/ projects to the NARP 2012.

11. Planned Research Programmes of the Major Thrust Areas in Agricultural Research

Thrust area: Natural Resources Management

Research Programmes/ Projects

	Project Title	Recommended Budget (Rs.)	Institution
1	Effect of different levels of gypsum application with organic and inorganic fertilizer in Groundnut (<i>Arachis hypogaeae</i> L.)	250,000.00	Eastern University (Faculty of Agriculture)
2	Yield performance of eggplant crop to trickle and existing traditional surface irrigation in sandy regasol soil during yala season	285,000.00	Eastern University (Faculty of Agriculture)
		535,000.00	
3	Performance of a constructed wet land and filter beds to treat waste water from toddy distillery unit	2,060,000.00	University of Jaffna (Faculty of Agriculture)
4	Characterization and mapping of soils of Jaffna peninsula at series level	1,000,000.00	University of Jaffna (Faculty of Agriculture)

5	Study the performance of different Grape varieties under micro-irrigation with selected suitable agronomic practices in Jaffna Districts	439,500.00	University of Jaffna (Faculty of Agriculture)
3,499,500.00			
6	A Simple model to simulate the yield of tea (<i>Camelia sinensis</i> L.O.Kuntze) undervariable climates	140,000.00	Sabaragamuwa University of Sri Lanka (Faculty of Agricultural Sciences)
140,000.00			
7	Biochar : A sustainable technology for fertility degradation and carbon sequestration in rubber growing soils in Sri Lanka	7,000,000.00	Rubber Research Institute of Sri Lanka
7,000,000.00			
8	Productivity improvement of cocoa through integrated soil and plant nutrient management system including good management practices	800,000.00	Department of Export Agriculture
800,000.00			
9	Forecasting of paddy area and yield based on the High Resolution Satellite Imageries	10,000,000.00	Department of Agriculture NRMC
10,000,000.00			
10	Development of efficient water management packages for chilli and onion in the dry zone- Mahailluppalama	5,030,000.00	Department of Agriculture FCRDI
11	Present status of Sulphur in soils of Groundnut growing arrears of Southern and Uva provinces.	600,000.00	Department of Agriculture FCRDI/ GLORDC
5,630,000.00			
12	Adaptability testing of fertilizer use efficient technologies in farmers' fields	2,787,000.00	Department of Agriculture Rice Research & Development Institute

13	Assessment of water availability in paddy fields in Kurunegala District for optimum utilization of water in rice production	1,995,500.00	Department of Agriculture Rice Research & Development Institute
		4,782,500.00	
14	Integrated Nutrient Management for Sustainable Rice Ecosystem Management: Simulation for Traditional and Improved Rice Production in Dry Zone of Sri Lanka	319,000.00	Rajarata University of Sri Lanka (Faculty of Agriculture)
15	Development of Ground Water Resources Through Artificial Recharging Techniques: An Approach to Enhance Ground Water Resources in the Dry Zone Landscape	400,000.00	Rajarata University of Sri Lanka (Faculty of Agriculture)
		719,000.00	
TOTAL		33,106,000.00	

Thrust area: Plant Breeding

Research Programmes/ Projects

	Project Title	Recommended Budget (Rs.)	Institution
1	Development of Chilli hybrids through recombinant inbred lines (continuation)	2,590,000.00	Department of Agriculture FCRDI
2	Development of medium duration, high yielding and large seeded Groundnut variety (continuation)	348,000.00	Department of Agriculture FCRDI
3	Varietal Development of Big Onion (<i>Allium cepa</i> L.) (continuation)	1,420,000.00	Department of Agriculture FCRDI
Sub Total		4,358,000.00	
4	Improvement of Cowpea varieties for tolerance to moisture stress (continuation)	552,200.00	Department of Agriculture FCRDI/ GLORDC

5	Development of high yielding, short age and determinate type Mungbean variety, suitable for catch cropping under paddy fields in Dry Zone (continuation)	367,700.00	Department of Agriculture FCRDI/ GLORDC
6	Adaptability and Stability testing of selected Mustard lines under different agro-ecological regions (continuation)	2,200,000.00	Department of Agriculture FCRDI/ GLORDC
7	Development of high yielding, Stem and Root Rot Disease tolerant, white seeded Sesame variety. (continuation)	395,000.00	Department of Agriculture FCRDI/ GLORDC
Sub Total		3,514,900.00	
8	Development of high yielding, good quality Papaya varieties (continuation)	777,600.00	Department of Agriculture HORDI
9	Development of promising Durian varieties for commercial cultivation (continuation)	570,000.00	Department of Agriculture HORDI
10	Development of promising yard long bean or vegetable cowpea varieties for island-wide / regional cultivation in Sri Lanka. (continuation)	900,000.00	Department of Agriculture HORDI
11	Germplasm collection, conservation and evaluation of Grapes to develop new seedless Grape varieties	1,031,500.00	Department of Agriculture HORDI
Sub Total		3,279,100.00	
12	Development of good quality Pumpkin varieties for local consumption (continuation)	1,000,000.00	Department of Agriculture HORDI/ RARDC-MK
Sub Total		1,000,000.00	
13	Development of high yielding, good quality Bean varieties with conventional and molecular breeding techniques (continuation)	1,200,000.00	Department of Agriculture HORDI/ RARDC-BN

14	Technology development for seed potato production (continuation)	600,000.00	Department of Agriculture HORDI/ RARDC-BN
Sub Total		1,800,000.00	
15	Development of new Potato varieties for local conditions (continuation)	800,000.00	Department of Agriculture HORDI/ ARS-Sitaeliya
Sub Total		800,000.00	
16	Evaluation of Banana accessions for high yield, quality, disease tolerance and salt tolerance. (continuation)	650,000.00	Department of Agriculture HORDI/ ARS-Thelijawila
Sub Total		650,000.00	
17	Evaluation of citrus (Orange and Mandarin) varieties and different management techniques in different agro-ecological zones (continuation)	1,675,000.00	Department of Agriculture HORDI/ Fruit Crops Research & Development Centre
18	Yield and quality improvement of Mango (continuation)	1,000,000.00	Department of Agriculture HORDI/ Fruit Crops Research & Development Centre
Sub Total		2,675,000.00	
19	Development rice varieties for abiotic stresses: submergence, salinity, drought escape/tolerance and iron toxicity (continuation)	2,519,000.00	Department of Agriculture Rice Research and Development Institute
Sub Total		2,519,000.00	
20	Development of a Cinnnamon variety (<i>Connamomum zeylanicum</i> Blue) with high yield, superior oil quality, resistant to Rough Bark Disease and Cinnamon Wood Boring Moth (<i>Ichneumonitera cinnmomumi</i>)	400,000.00	Department of Export Agriculture
21	Multi-faceted crop improvement project on Black Pepper	850,000.00	Department of Export Agriculture
Sub Total		1,250,000.00	

22	Development of early selection criteria for screening tea germplasm for high black tea quality using a combination of biochemical and molecular markers	2,052,000.00	Tea Research Institute of Sri Lanka
Sub Total		2,052,000.00	
TOTAL		23,898,000.00	

Thrust area: Agricultural Biotechnology

Research Programmes/ Projects

	Project Title	Recommended Budget (Rs.)	Institution
1	Evaluation of nutritional profiles and anti- oxidant and antimicrobial properties of some selected mushrooms	1,119,000.00	Department of Agriculture HORDI/ ARS- Thelijjawila
2	<i>In-vitro</i> mutagenesis of Banana for Fusarium wilt (<i>Fusarium oxysporium</i> F. species <i>cubense</i> (Foc) resistance/tolerance	2,684,000.00	Department of Agriculture HORDI/ ARS- Thelijjawila
Sub Total		3,803,000.00	
3	Improvement of seed potato production technology	1,063,000.00	Department of Agriculture HORDI/ ARS- Sitaeliya
Sub Total		1,063,000.00	
4	Identification of virus and virus like diseases in papaya and develop sensitive detection methods for laboratory and field detection	1,400,000.00	Department of Agriculture HORDI/ PVIC
Sub Total		1,400,000.00	

5	Testing the authenticity, purity and contaminants of seed and planting materials of important crop varieties of national agriculture	2,028,500.00	Department of Agriculture PGRC
6	Molecular and phenotypic characterization of rice germplasm for drought	1,725,700.00	Department of Agriculture PGRC
7	Characterization and use of resistance in rice germplasm for development of resistant rice varieties against rice Brown Plant Hopper (BPH), <i>Nilaparvata lugens</i> (Stal)	1,335,000.00	Department of Agriculture PGRC
Sub Total		5,089,200.00	
8	<i>In vitro</i> clone propagation of Pepper (<i>Piper nigrum</i> L.) local selections with high yield and quality	1,819,000.00	Department of Export Agriculture
9	Technology innovation for large scale <i>in vitro</i> multiplication of Cardamom, Cinnamon, Black Pepper, Ginger and Turmeric	1,535,000.00	Department of Export Agriculture
10	Preparation of a bio-fertilizer (<i>Arbuscular mycorrhizae</i> - AM) and bio-control agents (<i>Trichoderma</i> species and <i>Pseudomonas florensense</i>) for the nursery and field applications in Black Pepper (<i>Piper nigrum</i> L.)	40,500.00	Department of Export Agriculture
Sub Total		3,394,500.00	
11	Development of disease resistant tea varieties through inter-specific – hybridization and embryo-rescue	2,022,000.00	Tea Research Institute of Sri Lanka
Sub Total		2,022,000.00	
12	Control of rice Sheath Blight by improving plant resistance through a Biotechnological approach	968,600.00	University of Peradeniya (Faculty of Agriculture)
Sub Total		968,600.00	

13	Development of Iron Toxicity tolerant rice lines using anther culture	1,244,000.00	University of Ruhuna (Faculty of Agriculture)
Sub Total		1,244,000.00	
14	Study on varietal identification, conservation and productivity enhancement of fruit crops (Mango, Banana and Jak)	660,000.00	University of Jaffna (Faculty of Agriculture)
15	Effectiveness of locally available microbial strains on crop performance	100,000.00	University of Jaffna (Faculty of Agriculture)
Sub Total		760,000.00	
16	Charaterization of the promoter sequence regions of the rubber elongation factor gene from Hevea Brasiliensis	100,000.00	Wayamba University of Sri Lanka (Faculty of Agriculture and Plantation Management)
Sub Total		100,000.00	
TOTAL		19,844,300.00	

Thrust area: Plant Protection

Research Programmes/ Projects

	Project Title	Recommended Budget (Rs.)	Institution
1	Management of weedy rice in wet seeded rice in Sri Lanka (continuation)	1,695,000.00	Department of Agriculture RRDI
Sub Total		1,695,000.00	
2	Development of pest and disease management packages for horticultural crop production systems. (continuation)	1,635,000.00	Department of Agriculture HORDI
Sub Total		1,635,000.00	

3	Development of effective management package for preventing Mosaic Virus emergence in Mungbean (continuation)	493,250.00	Department of Agriculture FCRDI/ GLORDC,
4	Determination of critical crop - weed competitive period and the effect of weeds on yield of Groundnut (continuation)	220,400.00	Department of Agriculture FCRDI/ GLORDC,
5	Identification of virus diseases in Cowpea cultivation and development of control package	431,200.00	Department of Agriculture FCRDI/ GLORDC,
Sub Total		1,144,850.00	
6	Detection of microbial contaminations at different stages of post harvest practices of Export Agricultural Crops (EACs), mainly Black Pepper (<i>Piper nigrum</i> L.) and its control (continuation)	196,900.00	Department of Export Agriculture
7	Management of Cardamom Thrips (<i>Sciothrips cardamomi</i>) in Cardamom (<i>Elettaria cardamomum</i> Maton) plantations under natural forests (continuation)	484,000.00	Department of Export Agriculture
8	Development of crop health based Integrated Pest management (IPM) package for managing Cinnamon pests (Arthropods, pathogens and weeds)	1,421,000.00	Department of Export Agriculture
Sub Total		2,101,900.00	
9	Rearing techniques for mass rearing of Cabbage and Brinjal pests, parasites and parasitoids for establishing a "Biological Pest Control Infirmary"	721,000.00	Department of Agriculture SCPPC
Sub Total		721,000.00	

10	Promotion of pest free import and export of plants and plants products	2,868,700.00	Department of Agriculture NPQS
Sub Total		2,868,700.00	
11	Management of Cashew Pest <i>Helopeltis antonii</i> sign by using Red Weaver Ant (<i>Oecophylla smaragdina</i> Fabr.)	766,165.00	Sri Lanka Cashew Corporation
Sub Total		766,165.00	
12	Morphometric and molecular characterization of Sri Lankan populations of <i>Pratylenchus loosi</i> with reference to climate change scenario in tea plantations.	475,000.00	Tea Research Institute
Sub Total		475,000.00	
13	Isolation, characterization and mass production of mycopathogens to manage pests of crops	813,000.00	University of Jaffna Faculty of Agriculture
Sub Total		813,000.00	
14	Biocontrol of Aphids and other small Arthropods using coccinellid predators through mass release in legume vegetable ecosystem	1,044,300.00	University of Peradeniya (Faculty of Agriculture)
15	Investigation of presence and levels of pesticide residues in selected food crops grown in Anuradhapura, Pollonnaruwa and Nuwaraeliya Districts of Sri Lanka and assessment of farmer awareness on pesticide usage on the above crops.	1,645,000.00	University of Peradeniya (Faculty of Agriculture)
Sub Total		2,689,300.00	
16	Screening of common weeds species with medicinal properties for allelopathic activity, using sandwich method (continuation)	175,000.00	Uva Wellassa University (Faculty of Animal Science and Export Agriculture)
Sub Total		175,000.00	
TOTAL		15,084,915.00	

Thrust area: Agricultural Machinery and Equipment

Research Programmes/ Projects

	Project Title	Recommended Budget (Rs.)	Institution
1	Designing a profitable drip irrigation systems for young coconut palms	325,000.00	Sabaragamuwa University of Sri Lanka (Faculty of Agricultural Sciences)
Sub Total		325,000.00	
2	Improve the existing ground nut decorticator cleaning device.	50,000.00	Department of Agriculture Farm Mechanization Research Centre
3	Modification of Pulse Processing Machine	75,000.00	Department of Agriculture Farm Mechanization Research Centre
4	Redesign low land power weeder	200,000.00	Department of Agriculture Farm Mechanization Research Centre
5	Introduce a High Capacity 4 wheel Tractor Powered Axial Flow Water Pump for medium and large scale farmers.	200,000.00	Department of Agriculture Farm Mechanization Research Centre
6	Introduce automated feeding system for the high capacity seed paddy cleaner.	250,000.00	Department of Agriculture Farm Mechanization Research Centre
7	Design and Fabricate riding type drum seeder	310,000.00	Department of Agriculture Farm Mechanization Research Centre
8	Fertilizer Applicator for 4 W tractor coupled Injector Planter.	120,000.00	Department of Agriculture Farm Mechanization Research Centre
Sub Total		1,205,000.00	
TOTAL		1,530,000.00	

Thrust area: Post Harvest and Value Addition

Research Programmes/ Projects

	Project Title	Recommended Budget (Rs.)	Institution
1	Post Harvest processing of paddy grain to obtain quality parboiled rice to meet high consumer demand, Jaffna	2,000,000.00	University of Jaffna (Faculty of Agriculture)
	Sub Total	2,000,000.00	
2	Development of tray drying technology to improve quality of export agricultural crops	940,000.00	Department of Export Agriculture
	Sub Total	940,000.00	
3	Near Infrared Spectroscopy (NIRS) for nondestructive and fast selection of better quality fruits of papaya, Banana, and Mango with special reference to artificial ripened fruits using Calcium Carbide	310,000.00	University of Ruhuna (Faculty of Agriculture)
	Sub Total	310,000.00	
4	Raw materials standardization of newly introduced variety of <i>Withania somniferato</i> for development of ready to drink health drink	53,000.00	Wayamba University of Sri Lanka (Faculty of Agriculture and Plantation Management)
5	Biaoactive compounds, antibacterial properties and antioxidant capacities of different tea types and their grades produced in Sri Lanka (continuation)	131,000.00	Wayamba University of Sri Lanka (Faculty of Agriculture and Plantation Management)
	Sub Total	184,000.00	
6	Assessment of rice processing village program (Continuation)	162,000.00	Institute of Post Harvest Technology

7	Development of an energy efficient particle grader for rice flour industry (Continuation)	55,000.00	Institute of Post Harvest Technology
8	Development of a small scale paddy drier (Continuation)	51,000.00	Institute of Post Harvest Technology
9	On the role of pre gelatinization in the quality improvement of rice flour (Continuation)	70,000.00	Institute of Post Harvest Technology
10	Process improvement of paddy parboiling in rice milling industry (Continuation)	195,700.00	Institute of Post Harvest Technology
11	Formulation of edible fruit wax for commercial use (Continuation)	28,000.00	Institute of Post Harvest Technology
12	Study of the use of GRAS compounds to control post harvest diseases in tomato (Continuation)	195,500.00	Institute of Post Harvest Technology
13	Use of plastic crates in supermarket supply chain: a case study (Continuation)	207,000.00	Institute of Post Harvest Technology
14	Characterization of antioxidant properties of selected medicinal plant available in Sri Lanka and development of rice based herbal food products (Continuation)	260,000.00	Institute of Post Harvest Technology
15	Development of Murunga (<i>Moringa oleifera</i>) leaves based nutri-mix and a bread spread (Continuation)	161,500.00	Institute of Post Harvest Technology
16	Development of novel rice based snacks (Continuation)	14,500.00	Institute of Post Harvest Technology
17	Value addition of underutilized fruits through the development of novel ready to serve fruit products (Continuation)	95,000.00	Institute of Post Harvest Technology
Sub Total		1,495,200.00	
TOTAL		4,929,200.00	

Thrust area: Floriculture Research and Development

Research Programmes/ Projects

	Project Title	Recommended Budget (Rs.)	Institution
1	<i>Ex situ</i> conservation and utilization of genetic resources of <i>Anthurium andraeanum</i>	1,275,000.00	Department of Agriculture HORDI/ RARDC Makadura
Sub Total		1,275,000.00	
2	Producing new varieties of conventional crops as well as potential ornamentals from native plants of Sri Lanka (eg. <i>Chirita</i> species., <i>Exacum</i> species. etc.)	600,000.00	Department of National Botanic Gardens
3	<i>In-vitro</i> propagation of <i>Gerbera</i> , <i>Chirita</i> species. <i>Acrotrema</i> species. and <i>Bambosa</i> species.	900,000.00	Department of National Botanic Gardens
4	Media and fertilizer treatments for Orchids: Effect of climate and Agro-ecological zones on quality and growth of <i>Cordyline terminalis</i> as well as <i>Dracaena sandarivanan</i>	500,000.00	Department of National Botanic Gardens
5	Developing suitable growing media for the aquatic plant <i>Cryptocoryne waikeri</i> .	350,000.00	Department of National Botanic Gardens
6	Effect of growth hormones on sucker/ shoot formation of <i>Anthuriums</i> , <i>Cholorophytum commosum</i> , <i>Aglaonema</i> species. and <i>Ophiopogon</i> species.	450,000.00	Department of National Botanic Gardens
7	Post harvest handling of <i>Cordyline terminalis</i> and any other suitable cut green	550,000.00	Department of National Botanic Gardens

8	Identification of causal organisms as well as effective management of pest and disease incidences of floriculture crops	700,000.00	Department of National Botanic Gardens
9	Seed / spore germination trials on <i>Acrotrema</i> Species. and <i>Anemia phyllidittidis</i>	400,000.00	Department of National Botanic Gardens
10	Development of application of Bio-fertilizers for floriculture crops	50,000.00	Department of National Botanic Gardens
11	Mutation induction and breeding new varieties	500,000.00	Department of National Botanic Gardens
		5,000,000.00	
12	Development of protected crop technologies for improving yield and post harvest quality of roses and gerbera	177,000.00	University of Peradeniya (Faculty of Agriculture)
13	Development of direct gene transfer technique to produce new cut flower varieties (Continuation)	1,295,000.00	University of Peradeniya (Faculty of Agriculture)
Sub Total		1,472,000.00	
14	Genetic improvement of Sri Lankan anthurium varieties for a novel flower colour, early flowering and potted plant structure through genetic engineering (Continuation)	730,000.00	University of Ruhuna (Faculty of Agriculture)
Sub Total		730,000.00	
TOTAL		8,477,000.00	

Thrust area: Organic Agriculture and Agro-Forestry

Research Programmes/ Projects

	Project Title	Recommended Budget (Rs.)	Institution
1	Technical, financial and social aspects of Coconut-Cashew Intercropping	644,000.00	Rajarata University of Sri Lanka (Faculty of Agriculture)
2	Potential Use of Agro-forestry and Silviculture in Sustaining the Livelihood of the Rural Community in the Dry Zone of Sri Lanka (Continuation)	125,000.00	Rajarata University of Sri Lanka (Faculty of Agriculture)
3	Morphological and Genetic Characterization of <i>Terminalia chebula</i> (Aralu) in Sri Lanka with Relation to Its Ecological Distribution (Continuation)	87,500.00	Rajarata University of Sri Lanka (Faculty of Agriculture)
Sub Total		856,500.00	
4	Clonal propagation of <i>Eucalyptus grandis</i>	1,282,000.00	Forest Department
5	Determining factors of choice of species and harvesting decisions of timber in homegardens	800,000.00	Forest Department
6	Construction of a volume ,yield and biomass tables for <i>Khaya senegalensis</i> , A. Juss and evaluate the growth potential of <i>Khaya</i> in the Dry Zone of Sri Lanka	800,000.00	Forest Department
7	Assessment and characterization of agroforestry systems in Sri Lanka	280,000.00	Forest Department
8	Restoration of degraded forests in Dry Zone, Sri Lanka	934,000.00	Forest Department

9	Assessment of the impact of invasive climbers on forest tree growth and biodiversity in selected natural forests in the Intermediate Zone of Sri Lanka	595,000.00	Forest Department
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Sub Total	4,691,000.00
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TOTAL	5,547,500.00
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Thrust area: Socio-Economics and Policy Analysis

Research Programmes/ Projects

	Project Title	Recommended Budget (Rs.)	Institution
1	Total factor productivity decomposition of rice in Sri Lanka	150,000.00	Department of Agriculture SEPC
2	Intensification and diversification of rice cultivation in Sri Lanka	100,000.00	Department of Agriculture SEPC
3	Evaluation of potato seed production programme of Agriculture Research Station at Sita Eliya	200,000.00	Department of Agriculture SEPC
4	Evaluation of pesticide usage of paddy farmers in Anuradhapura district (continuation)	200,000.00	Department of Agriculture SEPC
5	Study on farmers' perception and decision on recommended rice varieties adoption in Sri Lanka (Continuation)	500,000.00	Department of Agriculture SEPC
6	Price protection on adoption of environmentally interactive technologies	125,000.000	Department of Agriculture SEPC
7	Assessment of wild life risk on food crop production (continuation)	500,000.00	Department of Agriculture SEPC
8	Study on production and marketing aspects of Maize	125,000.000	Department of Agriculture SEPC

9	Impact of regional trade agreements on agricultural trade in Sri Lanka	60,000.00	Department of Agriculture SEPC
10	Evaluation of productive efficiency of rice farming	200,000.00	Department of Agriculture SEPC
11	Assessment of social capital and farmers willingness to accept rice technologies in post conflict areas of Sri Lanka	275,000.000	Department of Agriculture SEPC
Sub Total		2,435,000.000	
12	Impact of hundred years services of the Department of Agriculture for the development of farming community	512,900.00	Hector Kobbekaduwa Agrarian Research and Training Institute
13	Use of Indigenous traditional knowledge for the development of paddy cultivation sector	421,000.00	Hector Kobbekaduwa Agrarian Research and Training Institute
14	Import Tariff of Agricultural Commodities: Implications on Domestic Markets	500,000.00	Hector Kobbekaduwa Agrarian Research and Training Institute
15	Determinants of vegetable seed production by farmers in Sri Lanka	331,000.00	Hector Kobbekaduwa Agrarian Research and Training Institute
16	Current status of the seed industry in other food crop sector and the effect of Government intervention on seed production	500,000.00	Hector Kobbekaduwa Agrarian Research and Training Institute
17	Viability of Controlled Environment Agriculture for vegetable farmers in Sri Lanka	600,000.00	Hector Kobbekaduwa Agrarian Research and Training Institute
18	Effect of rural infrastructure development on economic diversification in Southern Province	500,000.00	Hector Kobbekaduwa Agrarian Research and Training Institute
19	Assessment of indigenous yams as a subsidiary food crop in Sri Lanka	300,000.00	Hector Kobbekaduwa Agrarian Research and Training Institute

20	NGO approaches for small tank cascade rehabilitation: Socio - Economic and institutional perspective	378,000.00	Hector Kobbekaduwa Agrarian Research and Training Institute
21	Assessment of Solar Power Micro Irrigation Project implemented by the Ministry of Agriculture (continuation)	700,000.00	Hector Kobbekaduwa Agrarian Research and Training Institute
22	Estimating the efficiency of agro-chemical usage in potato farming in Sri Lanka	550,000.00	Hector Kobbekaduwa Agrarian Research and Training Institute
23	Production and utilization of organic fertilizer	442,000.00	Hector Kobbekaduwa Agrarian Research and Training Institute
24	An Evaluation of selected Dedicated Economic Centers: Comparative analysis in Veyangoda, Norochcholei and Nuwara Eliya	840,000.00	Hector Kobbekaduwa Agrarian Research and Training Institute
25	Production of Compost from Municipal Solid Wastes (MSW): Potentials and Constraints	100,000.00	Hector Kobbekaduwa Agrarian Research and Training Institute
26	Export of organic food: Present status, constraints and future scope	263,000.00	Hector Kobbekaduwa Agrarian Research and Training Institute
27	Consumption pattern and Consumer preferences: A study of fresh and processed fruits in the Western Province	478,000.00	Hector Kobbekaduwa Agrarian Research and Training Institute
28	Forward Contracts as Pre-harvest Commodity Marketing: Problems and Prospects	960,000.00	Hector Kobbekaduwa Agrarian Research and Training Institute
29	Value Chain of perishable crops	484,000.00	Hector Kobbekaduwa Agrarian Research and Training Institute
Sub Total		8,859,900.00	

30	An inquiry into the innovativeness in the agribusiness sector of Sri Lanka	400,000.00	Wayamba University of Sri Lanka (Faculty of Agriculture and Plantation Management)
Sub Total		400,000.00	
31	Technology refinement on framing systems and harvesting practices for rubber smallholders in Monaragala District	715,900.00	Rubber Research Institute of Sri Lanka
32	Empowering rubber farmers in non-traditional rubber growing areas through knowledge on combating adverse impacts of environment for better productivity	803,500.00	Rubber Research Institute of Sri Lanka
Sub Total		1,519,400.00	
33	Community based Agro-Enterprise development	420,000.00	Sabaragamuwa University of Sri Lanka (Faculty of Agricultural Sciences)
Sub Total		420,000.00	
34	Exploring tea grower's indigenous tea cultivation practices and development of low-input, intermediate technologies, appropriate for small scale tea growers in Sri Lanka (A pro-poor farmer participatory technology development approach)	320,000.00	Tea Research Institute of Sri Lanka
35	Storage of workforce in the tea plantation sector in Nuwara Eliya and Badulla Districts: Critical analysis and strategies to face the future challenges	1,884,000.00	Tea Research Institute of Sri Lanka
36	Interregional productivity variations among tea small holdings in Sri Lanka	200,000.00	Tea Research Institute of Sri Lanka
Sub Total		2,404,000.00	
37	Establishment of a rural Agribusiness Centre to cater the agricultural and agribusiness community	100,000.00	University of Ruhuna (Faculty of Agriculture)
Sub Total		100,000.00	

TOTAL

16,138,300.00

Thrust area: Livestock, Aquaculture and Fisheries

Research Programmes/ Projects

	Project Title	Recommended Budget (Rs.)	Institution
1	Effect of environmental, physiological, management factors and Beta hydroxybutyrate at insemination on conception rate of cattle in dry zone of Sri Lanka	197,000.00	Eastern University of Sri Lanka (Faculty of Agriculture)
Sub Total		197,000.00	
2	Identification, Characterization and Development of Under exploited pasture and fodder species for ruminant and nonruminant in Sabaragamuwa Province	912,000.00	Sabaragamuwa University of Sri Lanka (Faculty of Agricultural Science)
Sub Total		912,000.00	
3	Impact of aquatic Alien Invasive Species (AIS) on biodiversity of freshwater in Western Province of Sri Lanka	1,147,000.00	University of Kelaniya (Faculty of Science)
Sub Total		1,147,000.00	
4	Preservation of forage as hay in the Dry Zone and as silage in the Wet Zone of Sri Lanka	1,200,000.00	University of Peradeniya (Faculty of Agriculture)
5	<i>Ex situ</i> conservation and Nucleus Herd Establishment for Kottukachchiya breed of goats in Sri Lanka	3,800,000.00	University of Peradeniya (Faculty of Agriculture)
6	Bioactive compounds from Sri Lankan herbs and spices as alternatives to antibiotic growth promoters in broiler chicken diets (continuation)	854,000.00	University of Peradeniya (Faculty of Agriculture)

7	Development of codes of practices for farm animals and animal welfare in Sri Lanka (continuation)	309,000.00	University of Peradeniya (Faculty of Agriculture)
Sub Total		6,163,000.00	
8	Studies on the use of DNA based techniques in the selection of animals with higher breeding value and disease resistance in goats	1,000,000.00	University of Peradeniya (Faculty of Veterinary Medicine and Animal Science)
9	Rapid detection methods for economically important viral diseases of giant tiger shrimp- <i>Penaeus monodon</i> in Sri Lanka	825,000.00	University of Peradeniya (Faculty of Veterinary Medicine and Animal Science)
10	Use of Irradiated Larval vaccine to control gastrointestinal helminth infection in small ruminants in Sri Lanka	1,500,000.00	University of Peradeniya (Faculty of Veterinary Medicine and Animal Science)
Sub Total		3,325,000.00	
11	Ecological investigation of factors effecting on zooplankton dynamics and fishery production and developing an ecological model for Muruthawela reservoir	1,680,000.00	University of Ruhuna (Faculty of Fisheries and Marine Sciences and Technology)
Sub Total		1,680,000.00	
12	Reduction of cholesterol contents of broiler meat using dietary rice bran and herbal materials	290,000.00	University of Ruhuna (Faculty of Agriculture)
Sub Total		290,000.00	
13	Genetic variation in traits associated with disease resistance in wild Guppy and ornamental Guppy in Sri Lanka	237,000.00	Uva Wellassa University of Sri Lanka (Faculty of Animal Science and Export Agriculture)

14	Investigate potential for development for aquatic plants and ornamental fish in Uva Province and development of artificial propagation technique for potential endemic aquatic plants and captive breeding techniques for endemic fish species (continuation)	130,000.00	Uva Wellassa University of Sri Lanka (Faculty of Animal Science and Export Agriculture)
15	Development of a culture media for kefir grains containing <i>Lactobacillus</i> species, <i>Leuconostoc</i> species, <i>Streptococcus</i> species, and <i>Saccharomyces</i> species using locally available carbohydrate substrates	300,000.00	Uva Wellassa University of Sri Lanka (Faculty of Animal Science and Export Agriculture)
Sub Total		667,000.00	
16	Quantification, characterization and quality improvement of locally available rice polish/bran for poultry feeds	650,000.00	Veterinary Research Institute
17	Diagnosis of Marek's disease in poultry through developing a Histopathological Index	720,000.00	Veterinary Research Institute
18	Antibody response in chicken to live and inactivated infectious Bursal disease vaccines in field situation	688,000.00	Veterinary Research Institute
19	Effect of feed grade antibiotics on dietary trypsin inhibitor activity and sub-clinical necrotic enteritis in broiler chickens	262,000.00	Veterinary Research Institute
20	Serological evidence of Foot and Mouth Disease in goat population of Sri Lanka	460,000.00	Veterinary Research Institute

21	Development of starter culture and evaluation of functional and sensory properties of mozzarella cheese from buffalo and cow milk.	120,000.00	Veterinary Research Institute
22	Evaluation of aflatoxin MI Levels in cow milk and effects of toxin binders on the production and performance of dairy cows	500,000.00	Veterinary Research Institute
23	Study on quality and strategies to improve the quality of locally produced maize.	788,000.00	Veterinary Research Institute
24	Effect of different milk preservation techniques on keeping quality of raw milk of cows	200,000.00	Veterinary Research Institute
25	Evaluation of nutritional and health status of goats in Thelahera Goat Breeding Center	433,000.00	Veterinary Research Institute
26	Assessment of potential disease threat posed by back yard poultry in Sri Lanka	210,000.00	Veterinary Research Institute
27	Epidemiological investigation on recent sporadic outbreaks of unidentified syndrome with hemorrhage/lameness/weakness in poultry	375,000.00	Veterinary Research Institute
28	Monitoring IBD antibody levels of four different indigenous poultry strains in order to select the fittest strain for a breeding program.	445,000.00	Veterinary Research Institute
29	Salmonella contamination of the products and environment of chicken processing plants	500,000.00	Veterinary Research Institute
30	Microbial load, composition, keeping quality and prevalence of <i>Listeria</i> species. in Ready to drink pasteurized milk products	500,000.00	Veterinary Research Institute

31	Development of Haemorrhagic Septicaemia Black-Quarter combined vaccine for cattle and buffaloes	300,000.00	Veterinary Research Institute
32	Foot and Mouth Disease outbreaks Foci of origin and route of spread of the infection	500,000.00	Veterinary Research Institute
33	Determination of sensitivity of different cell cultures in isolating & adapting Foot and Mouth Disease Virus in Sri Lanka	525,000.00	Veterinary Research Institute
34	Economic evaluation of seed production for pasture development in Sri Lanka	600,000.00	Veterinary Research Institute
35	Evaluation of some multi-cut fodder Sorghum varieties for dairy development in Sri Lanka	600,000.00	Veterinary Research Institute
36	Assessment of feasibility of using female sexed bovine semen in intensively and semi-intensively managed farms in Central province	1,500,000.00	Veterinary Research Institute
37	Post Partum Ovarian Activity measured by milk Progesterone concentrations and factors affecting resumption of ovarian activity in high producing dairy cows	500,000.00	Veterinary Research Institute
38	Investigation of reported Oxytetracycline resistance in cattle at Polonnaruwa NLDB farm and implementation of a new treatment regime or a new therapeutic agent for immature Paramphistomiasis	250,000.00	Veterinary Research Institute
39	Development of udder-base infusion for dry cow treatment	500,000.00	Veterinary Research Institute

40	Formulation of effective organic acid blend to control common enteric disease, Salmonellosis in poultry	500,000.00	Veterinary Research Institute
41	An epidemiological study on Bovine Babesiosis in Sri Lanka	443,000.00	Veterinary Research Institute
42	Evolving a synthetic breed of dairy cattle using a local strain as a base population to suit the low input farming system in Sri Lanka	2,145,000.00	Veterinary Research Institute
43	Production of genetically superior heifer calves through introduction of rotational breeding for the extensively reared large scale local cattle herds in the dry zone	705,000.00	Veterinary Research Institute
44	Investigation of immune response of locally produced vaccine against Newcastle Disease in commercial layers	350,000.00	Veterinary Research Institute
45	Foot and Mouth Disease vaccine efficacy in different age groups of cattle and buffalo by LPB ELISA	500,000.00	Veterinary Research Institute
46	Use of Geographical Information System to develop specific control strategies for mastitis in different regions of the country.	300,000.00	Veterinary Research Institute
Sub Total		17,069,000.00	
47	Product diversification of Tilapia/Carp catch to support the Government policy of Inland Fishery in Sri Lanka	1,350,000.00	Wayamba University of Sri Lanka (Faculty of Livestock, Fisheries and Nutrition)
Sub Total		1,350,000.00	
TOTAL		32,800,000.00	

12. Funding mechanism of Research under National Agricultural Research Plan Research Progress Monitoring Mechanism

Flow of activities:

- Submission of the research programme/project proposal and the Activity Plan by the researcher/s who is going to undertake the research study.
- Reviewing/ Evaluation research proposal and the plan by the National/ Specialist Committees functioning at SLCARP.
- Approval of the research project for operation if the proposed research comes under major thrust areas and with expected standards
- Appointment of a Project Monitoring Team to monitor the project operations and to evaluate project progress.
- Submission of the progress report on the project every six months period.
- Confirmation the progress: Visiting of the research site, presentations by the researchers to the relevant National/ Specialist Committee

If the progress is unsatisfactory/not up to the expected level, holding of the discussion with research team to make necessary correction and to take necessary steps to upgrade the research

- Recommendation to release funds on project operations of the next six months period.

(The progress of the project will be monitored by the Monitoring Team by consideration of progress report every six month during the whole project period. Disbursements of research funds will be decided on the status of the performance of the project.)

- Holding of the **First Year Research Review Meeting** of the researchers who carryout research studies in the same subject area.
Consideration of a certain number of research projects at one such meeting.

- Holding of **Mid Term Research Review Seminars** in the middle of the research projects to evaluate the progress of the ongoing research studies.
Correction of deviations, short coming of the research, if any
- Holding of **End Term Research Seminars** to consider and review the results of the research projects.
- Suggestions and recommendations on the preparation of the Final Report of the research study
- Guidance to publish research papers
- Deriving of research recommendations and implementations in the Agricultural Sector.

13. Dissemination of the findings of the research projects Technology Transfer

A research is fruitless unless its findings are disseminated to beneficiaries. The beneficiaries belong to two categories: Direct beneficiaries are people who are directly benefited from the project (Stakeholders) whereas indirect beneficiaries such as policy makers, who are benefited indirectly from a project. The findings intended to be achieved and their means of transfer have to be clearly indicated in the research proposal itself. Process of the technology transfer is a collective effort of the researcher who carryout the research project, institute to which the researchers belonged, Central Coordinating Body in Agricultural Research such as SLCARP and the funds releasing organization.

Technology transfer is not an exercise which has to be done after completion of a study. As the research is going on transferable technologies should be identified for dissemination. Similarly, the beneficiaries should also be identified.

At First Year Research Review Meeting, Mid Term Research Review Seminars and End Term Research Seminars transferable technology would be identified by the Spiciest Committee with help of researchers, specialists in the subject area and stakeholders. Beneficiaries in each sector and areas of agriculture would be identified by the same method.

Means of technology transfer

Before a finding is disseminated, it has to be transformed into a simple language and presented in local language/s so that the end-users are easily comprehensible. The researcher should bear this responsibility.

The means of transfer can be extension agents, such as Agriculture Instructors of the Department of Agriculture, Extension Officers of the Department of Export Agriculture and Livestock Development Instructors of the Department of Animal Production and Health etc.

Holding of meetings by Central Coordinating Body in Agricultural Research to make awareness of such officers would be done.

Printed materials: brochures, posters, booklets etc; electronic media: radio and television programs and participatory methods such as field days and field demonstrations are used whatever deem appropriate for the dissemination of related agricultural technologies.

Central Coordinating Body will guide the institutions in preparation of these documents

The Central Coordinating Body would also take steps to publish a periodical document on the research findings targeting intended beneficiaries. The appropriate timeframe would be decided before any technologies are transferred to reap the maximum benefit.

Getting feedback

Mere transferring the technology does not mean that the intended results are achieved. It is equally important to find out whether transferred technology is effectively used.

The Central Coordinating Body will design a suitable mechanism through field level officers to investigate whether the recipients have correctly grasped and practiced the already disseminated technologies.

An assessment would be done after giving reasonable time to see whether technology transfer process is successful. If shortcomings are detected in the technology transfer process, remedies would be taken by changing technology transfer strategies.

National Agricultural Research Plan (NARP) 2011-2013 of Sri Lanka

Year 2012

Allocations Required for Institutions

	Institution	Recommended Budget (Rs.)	No.of Projects
1	Department of Agriculture	65,343,250.00	57
2	Hector Kobbekaduwa Agrarian Research & Training Institute	8,859,900.00	18
3	Institute of Post Harvest Technology	1,495,200.00	12
4	Sri Lanka Cashew Corporation	766,165.00	1
5	Department of Export Agriculture	8,486,400.00	10
6	Department of National Botanic Gardens	5,000,000.00	10
7	Tea Research Institute of Sri Lanka	6,953,000.00	6
8	Rubber Research Institute of Sri Lanka	8,519,400.00	3
9	Veterinary Research Institute	17,069,000.00	31
10	Forest Department	4,691,000.00	6
11	University of Peradeniya	14,617,900.00	12
12	University of Ruhuna	4,354,000.00	6
13	Rajarata University of Sri Lanka	1,575,500.00	5
14	Sabaragamuwa University of Sri Lanka	1,797,000.00	4
15	Wayamba University of Sri Lanka	2,034,000.00	5
16	Eastern University of Sri Lanka	732,000.00	3
17	Uva Wellassa University	842,000.00	4
18	University of Jaffna	7,072,500.00	7
19	University of Kelaniya	1,147,000.00	1
TOTAL		161,355,215.00	201

Note: Coconut Research Institute of Sri Lanka, Sugarcane Research Institute of Sri Lanka, Palmyrah Development Board and National Aquatic Resources Research and Development Agency have not submitted the research programmes/ projects to be included in National Agricultural Research Plan 2011.

Annex 01

Members of National Committee on Research Programmes and Projects (NCRPP)

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Dr Chandrika Nanayakkara
Dr R S Wilson Wijeratnam
Dr D S A Wijesundera
Dr Amitha Bentota
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