PERFORMANCE REVIEW OF THE PLANT PROTECTION SERVICES OF DEPARTMENT OF AGRICULTURE

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Review Team

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Prologue

The Review Team wishes to enlighten the readers that although this report is titled as a "Performance Report of the Plant Protection Service" during the three years, 2016-2019, it has traversed the entire plant health sector in the country; viz. plant quarantine, internal plant protection, pest status and their management strategies by the many national level crop research institutes, legislation connected to plant protection, stakeholder interests and international obligations.

Plant protection in islands is relatively less complex than in land-locked countries. The Indian Ocean has blessed this country with the protection it needs to safeguard the fauna and flora from external antagonists and adversaries. It is up to the government to respect this gift of nature to establish scientific and administrative ware for minimizing external threats and pave the golden path toward securing the quantity and quality of food for all the inhabitants.
The customary short Executive Summary herein is expanded to an Extended Executive Summary by a presentation on the need for a Plant Health Policy for the country as a prerequisite for safeguarding the crop production geosphere. Dangers posed by shortsighted trade agreements with a number of countries that could jeopardize plant health are also dealt with in the Extended Executive Summary. The text, we believe, covers the essential ingredients needed for comprehensive administrative strategies for protection of plants in the country and should be considered as a standalone pathway or a contributor to the preparation of an overall National Agricultural Policy.

The reviewers hope that this document would energize think tanks to resurrect the Plant Protection Service from its depleted status. We appeal to all parties to concentrate more on the recommended administrative reforms that would strengthen national plant health and thereby the innumerable stakeholders in agriculture.

Acknowledgements

The Team of Reviewers wishes to express gratitude to the Chairperson and the Scientific Staff at the National Science and Technology Commission (NASTEC) for entrusting us to undertake the Performance Review of the Plant Protection Service (PPS) of the Department of Agriculture.

We are grateful to Mr. Seyed Shahmy, Senior Scientist at the NASTEC, for continuous assistance given during the review period.

We are also grateful to the Additional Director of PPS, Dr. Dayani Perera, now promoted to post of Director (Seed Certification and Plant Protection Centre), the supervisory position of the PPS for making in-depth presentations to the Team as well as the stakeholders at the inception of the study, and to all the staff members at PPS for the assistance extended throughout.

Special thanks are due to Dr. WMW Weerakoon, the Director General of Agriculture for encouragement and facilitation to conduct this important review and to Mrs. JKA Hettiarachchi, Director of the Seed Certification and Plant Protection Centre (SCPPC) (now retired) for the sincere support given.

Our appreciation is extended to Dr. Gamini Samarasinghe, Director (Horticultural Crop Research and Development Institute) and his senior staff for candid discussions on PPS, its current status and future prospects for further development. The ready assistance given by Dr. J.A. Sumith, the Registrar of Pesticides, and Dr. Mangalika Nugaliyadde, Senior Scientist at ROP office is sincerely acknowledged.

The stakeholders from around the country provided a highly significant response to the invitations originated by NASTEC to participate at a meeting in Peradeniya where their views on the existing position of the PPS and how best it could be developed to serve their interests in the short and long terms were discussed at length. We wish to thank them for their frank opinions and information.

We appreciate those readers at policy level who would consider the recommendations herein and make the necessary amendments and facilitations needed to make the Plant Protection Service of the DoA a nationally important organization that could match international obligations in the modern day context.

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Acronyms

CPPS	Central Plant Protection Service
CRI	Coconut Research Institute
DEA	Department of Export Agriculture
DGA	Director General of Agriculture
DoA	Department of Agriculture
FAO	Food and Agriculture Organization
FCRDI	Field Crops Research and Development Institute
FMRC	Farm Mechanization Research Centre
FRDI	Fruit Research and Development Institute
GSS	Global Surveillance System
HORDI	Horticultural Crops Research and Development Institute
NPPC	National Plant Protection Centre
NPQS	National Plant Quarantine Service
OFC	Other Field Crops
PPS	Plant Protection Service
PRA	Pest Risk Analysis
PRI	Palmyrah Research Institute
ROP	Registrar of Pesticides
RRDI	Rice Research and Development Institute
RRI	Rubber Research Institute
SAR	Self-Assessment Report
SCPPC	Seed Certification and Plant Protection Centre
SRI	Sugarcane Research Institute
TRI	Tea Research Institute

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Extended Executive Summary

Protection of plants from pests is important not only in agricultural crops and their products, but also in all the flora in the environment. As such, plant protection increasingly involves the entire geosphere and is thus an integral component of environment management. The science of plant protection seeks answers to environmental sustainability goals, while safeguarding global food security and production of industrial raw materials of plant origin.

The review of the Plant Protection Service (PPS) of the Department of Agriculture was undertaken on behalf of the National Science and Technology Commission (NASTEC) with the above all-inclusive agenda in mind. Although the task was to review the performance of PPS during the three-year period 2016-2018, it would be a futile exercise if a deep dive is not made to elucidate its evolution and past performance.

The PPS had its grandeur in the 1970s when the entire gamut of administrative paraphernalia including the legislative powers were within its grasp to ensure that not only those pests that are found in our environment, but also the potential pests from outside the country were under its' strict scrutiny and restriction. Therefore, cohesive, systematic administrative essentials were operationalized by the PPS at entry point quarantine, internal quarantine and local plant protection powered by the then Plant Protection Ordinance (PPO) No 10 of 1924 (as amended) and its regulations. Presently, PPS is devoid of the entry point control and internal quarantine, which are severe deficiencies for scientific and coordinated plant protection in Sri Lanka. In the internal plant protection matter, most of the district level or provincial level plant protection extension service offices of the past do not exist except the single entity at Mahailluppallama. The country-wide operational deficiency is felt by all stakeholders including the farmers, government and the private sector at all levels. Simultaneously, it must be stated that the customary, annually reported physical and financial performance efficiency may not be visible because of the miniscule scale of operation.

The mandated pilot testing of pesticides prior to official recommendation has also been limited to herbicides, which is attributed to staff shortage at PPS. However, whenever new pest outbreaks are reported, officers at the PPS headquarters have become operational with equipment and expertise to manage them effectively, which must be commended. Its operational efficiency would be exponentially perceptible, should staff deployment be realized. Staff deficiency in the DOA has drastically affected the PPS and its operations. Remaining few senior staff as at present are mostly re-hired retirees.

In the overall judgment, being an essential national organization both for comprehensive plant protection and international collaboration, we strongly recommend that PPS should be up-scaled as the national focal point for plant protection and named as the National Plant Protection Centre (NPPC). All powers under the current Plant Protection Act No 35 of 1999 should be re-apportioned to the NPPC for effective delivery and in conformity to international requirements.

More importantly, in the context of global food safety, the reviewers noted that there is no single organization in the country for directing national policies addressing the judicious use of pest control chemical inputs as advocated by many entities, including the FAO/UNDP strategies of integrated pest management. We advocate further that the NPPC should be the leading national organization setting the policy framework for all crop research institutes of the country for the purpose of setting research priorities, prepare collaborative national programmes, and set time lines and monitoring mechanisms for plant protection that would minimize the use of chemical inputs for pest management of all crops. Therefore, the reorganization and proposed initiatives should receive the highest attention of the government that would, with time, win global acclaim and markets for brand "Sri Lanka".

This report outlines a mechanism for restructuring the PPS as an urgent requirement with a full-fledged Director under the immediate administration of the Director General of Agriculture (DGA). The innumerable stakeholders of the PPS including all the local crop research institutes and the country as a whole would benefit by this proposed modernization keeping in line with global aspirations and development goals in plant protection and environment management.

Continuation of the Extended Executive Summary: an important addendum

Development of a Plant Health Policy: challenges and outlooks



When the British government faced multiple challenges from famine-stricken poor laymen in their occupied coffee-country (Ceylon) and the devastation of their export earnings from crop failure in the 19th century, they did realize the importance of plant health. The coffee rust of foreign origin spread rapidly and wiped off entire villages, especially in the mid country where large land areas were mono-cultured with coffee. There were two lessons to learn: (a) never take plant health for granted, and (b) respect plant health as much as human health and take measures for disease prevention, which is the basic philosophy.

Though unwritten, the plant health policy of the British regime led to the creation of the Plant Protection Ordinance No. 10 of 1924 in Ceylon. The ordinance had virtually identical and strong provisions as the 1897 Quarantine and Prevention of Diseases Ordinance designed to prevent the entry of the plague and other devastating human diseases. Quarantine officials were empowered to board aircrafts, ships etc., for the prevention of plant diseases entering the country, similar to the human health protection laws. The then Director of Agriculture had appointed the authorized officers of the Plant Protection Services to be vigilant at ports of entry,

and inland quarantine measures were adopted in cases where pests had already established in the Sri Lankan environment. Entomology and Mycology laboratories operating in par with all globally recognized standards were located at Peradeniya. Therefore, both robust scientific and administrative mechanisms were in place to safeguard plant health.

We are currently beyond a century since the initial plant protection apparatus and the Plant Protection Ordinance began operations in the country. Further, the United Nations has declared 2020 as the International Year of Plant Health (IYPH). The year is a once in a lifetime opportunity to raise global awareness on how protecting plant health can help end hunger, reduce poverty, protect the environment, and boost economic development to achieve the Sustainable Development Goals (SDG) by 2030. The review team considered it a privilege to undertake the important study at this juncture.

The present review report of the PPS would not do justice for the agriculture sector if it did not truthfully expose the current scenario in plant health in the country and propose means by which the service could still be resurrected and strengthened for the greater benefit of farmers, consumers and the economy. We have factually considered the simultaneous developments of plant health protection in other countries and composed the following outlook.

1. What we have witnessed

The PPS was strong in establishment and operation during the 1970s up to about late 1980s and performed the pivotal role to implement the Plant Protection Ordinance and subsequent Acts and regulations on behalf of the DGA. The entry point control measures to prevent alien pests were in place and implemented efficiently. Failures were the entry of water plants Salvinia and Water Hyacinth. However, they did not pose major health problems to plants.

Later decline in the effectiveness of the service could probably be attributed to the restructuring of the DoA in the late 1980s where important “divisions” including the PPS, which functioned directly under a relevant and specific director such as the Director of Extension of the DoA, were absorbed and placed under newly created Directorates whose mandates were far deviated from the ground realities and emphasized specialization. For example, PPS went under the Director in charge of Seed Certification and Plant Protection who had five other important units under its command. Thus, the administrative distancing and dilution of attention perhaps led to the under-privileged status of the organization. The PPS role in implementation of the Plant Protection Act No. 35 of 1999 (PP Act) was limited to local plant protection and was detached from entry point control. Thus, it lost the unified and coordinated role essential for proper implementation of the PP Act as a whole. Its staff were transferred to entry points and other units of no relevance to plant protection. Today, the PPS is virtually rudderless without a head and depleted of scientific staff. Its role in serving as the PP flagship for all crop research institutes in the country, regulatory functions such as conducting independent pilot testing of pesticides prior to official recommendations, provision of regular training on PP for all organizations and technical backstopping of all stakeholders are rudimentary.

Oscillating Trade Policies and Trade Agreements: threat to plant protection

Successive governments have implemented trade policies which endangered the safe environment in the country in direct confrontation with the basic preventive policies of plant health. For example, alien crops such as the Irish potato landed in the up-country for planting purposes in the 1970s bringing unprecedented chaos in plant protection. Almost all the known potato diseases in the world are now resident in Sri Lanka. Environment cost of producing this crop would significantly surpass its economic benefit.

Other alien crop introductions and agricultural product introductions have added to the turmoil. It would be too elaborate to list them, and therefore, we would not delve into them here. Yet, there are many mechanisms for safe introduction of new crops or varieties and plant products. Principal among them are international guidelines on how to minimize risk through Pest Risk Analysis (PRA) through research before an alien crop or plant product is recommended or allowed to be introduced to another trading country. However, undue pressures to over-ride PRA requirements have jeopardized the scientific approach for safe introductions. The various trade agreements with FAO/WTO, such as the Trade Agreement with India to import tea and re-export as tea of Sri Lankan origin, and Trade agreement with India to allow arecanut and black pepper imports for re-export as Sri Lankan origin have destroyed the "Brand Sri Lanka" image. Several such signed agreements between governments have not properly considered the heavy risks of new product introductions and the necessity for international and scientific requirements for PRA. Consequently, the country faces the periodic emergence of alien pests of significance such as the noxious weeds Giant Mimosa, Alligator Weed and Scale Insects, which are visible to the naked eye. However, the microbial threats being imposed by alien pathogens and the surge of viruses, bacteria and nematodes are unprecedented. The country cannot afford the luxury of maintaining sophisticated, regularly updated laboratories, plant pathologists, virologists, nematologists, etc., to be continuous watchdogs. It must be stressed that small countries cannot oblige the WTO doctrine on non-tariff barriers in a scenario in which developing countries cannot afford routine scientific vigilance against alien microbes. Sri Lanka should have bargained for comprehensive staff strengthening opportunities and sophisticated laboratory facilities from developed countries and developing countries such as India prior to signing any agreements. Therefore, the reviewers advocate sane decision making by the authorities when embarking on Trade Agreements.

The International Plant Protection Convention (IPPC) has initiated Global Surveillance Systems (GSS) for pests and diseases and to share digital information with NPPOs such as the PPS/NPPC. Policy makers and researchers could access the data for PRA and safe decision making on acceptable product source countries.

1.2 Crop intensification and environment factors

Thrusts on crop intensification such as minimizing time lapse between seasons or continuous cultivation are threats to plant protection. Pest build up to epidemic levels have to be expected in such situations.

Climate change poses chances for the natural evolution of pest biotypes which show resistance to regular control measures. A serious case in point is the discovery of the new bio-type of Gall Midge in Sri Lankan rice fields during the last two seasons. The pest has apparently evolved against the in-built resistance of DoA-recommended rice varieties (please see cover page: silver shoot of rice).

2. What we foresee

At present, the PPS, in their day-to-day operations seem to concentrate on rapid response itineraries when pest outbreaks such as the Yellow Spotted Grasshoppers (please see cover page photo of the insect) occurred recently. These operations are face-saving for the depleted organization.

Globally, however, with increasing trade, phytosanitary authorities face many challenges and demands such as assessment of pest risk, updating research on pest control measures and planning for emergency responses to pest outbreaks. Some pest species, which hitherto remained dormant in the environment, have become virulent and bio-types of well-established pests are also emerging due to climate effect and are keeping pest control authorities increasingly on their toes. Therefore, with new threats, the PPS must be fully geared and strengthened as a priority in the agenda of the Department of agriculture (DOA). To realize a futuristic PPS, the country needs a strong Plant Health Policy that would create thorough awareness of the general public to face the emerging challenges to the agriculture sector.

3. Policy-wise what we recommend

3.1 Draft a Plant Health Policy: The absence of a Plant Health Policy has allowed *ad hoc* decision making at many levels thus rendering the plant protection services buoyant at times and neglected at other times. The impact of these oscillations and inconsistencies are being felt at the field level in a large number of crops. To cite a few; the virtually uncontrollable 30-year old Weligama Wilt of coconut is a case in point. The entire family of *Cucurbitacea* vegetables in the country is infected by pests of foreign origin. Potato and tomato cultivations are impossible without strong pesticides. Cucumber and water melon which could be easily grown in the country have new pests. Over two dozen fruit fly species are rampant and are a strong threat to most traditional fruit species.

The boom in international trade has many implications on plant health, globally. Being protected by the Indian Ocean, Sri Lanka is no exception and gradual collapse of the plant health system was apparent during the recent years, which would continue to affect the entire crop sector in the country.

Strengthening and sustenance of the PP service requires strong commitment of policy makers to prepare an all-inclusive Plant Health Policy for the country. Policy should be developed with the coordination of all crop research institutes of the country and stakeholders including the Universities and private sector. The exercise would update the plant health knowledge base locally, encompassing all sector players and also **provide the forum for the consolidation of the proposed NPPC under the DGA (please also see Executive Summary and Proposed organogram). Theme should be the sustenance of plant health covering the entire geosphere of the country.**

Plant health policy should identify the problems faced by all crop research institutions and their stakeholders including the farmers that restrict development of an efficient plant health system. It should provide the institutional mechanisms to realize the multi-focal objectives of plant health such as environment safety and food safety while providing for plant health. Further, the policy should re-visit the international obligations and requirement for harmonization of local plant protection regulatory mechanisms for conformity with global requirements. Creating public awareness of plant safety and their mechanisms should also receive prominence in the policy while advocating integrated pest management strategies starting from minimization of pest introductions to the country.
The new policy would necessitate the following actions.

3.2 Amend the Plant Protection Act No. 35 of 1999 and incorporate specific requirements regarding prohibition of introduction of materials of plant origin from outside the country which have not undergone official clearance after conducting a detailed PRA using the guidelines laid down by the IPPC or by any other risk assessment protocol developed and accepted by the government of Sri Lanka.

3.3. PRAs (or equivalent) should be conducted by teams of competent scientists drawn from key institutes per crop group and headed by the Director of the proposed NPPC to provide non-challengeable and conclusive recommendations.

3.4 Impose stringent punishments for offenders of the PP Act including terms of imprisonment for those convicted for smuggling prohibited materials of plant origin or aided in such activities.

3.5 Use web-based GSS information to update stakeholder knowledge on new global pest situations.

Chapter 1 - Introduction to the review

The National Science and Technology Commission (NASTEC) is empowered by the Science and Technology Development Act No. 11 of 1994. The NASTEC is mandated, among other responsibilities, to perform evaluation of the performance of Science and Technology institutions including those in the field of agriculture. Hence, a review of the Plant Protection Service (PPS) of the Department of Agriculture was commissioned in 2019.

The objective of NASTEC is to submit a report annually, to the government, reviewing the Science & Technology activities in Sri Lanka in the preceding year. Further, the effectiveness of measures for the development of human resources, the performance, the effectiveness of public spending on Science & Technology and the use of Science & Technology by public sector undertakings is reported by the NASTEC.

Agriculture: challenging historical facts

Less attention was given to domestic food production during British occupation though the country processed the capacity to produce almost the entirety of its food requirements. The main focus of the then government was on the plantation sector to enhance the export volume of tea, rubber and coconut at the expense of peasant sector, which concerned itself to the cultivation of rice and other food crops (OFC) at stagnant production levels. Most of the food requirements of the country were imported.

Since independence, the successive governments formulated policies to strengthen the peasant sector with significant legislation such as Paddy Lands Act No. 1 of 1956, Land Reform Law No. 1 of 1972, and price support systems, which boosted morale of the farmer and enhance local food production. However, oscillating food production policies of successive governments have continued during the last seven decades despite heavy investments in the improvement on irrigation systems in the dry zone provinces except the north, resulting in production of adequate volumes of rice since 2004.

1.1 Paddy sector

The rice/paddy sector has faced periodic insect outbreaks such as of Brown Plant Hopper (BPH), Gall midge and stem borer. Strong Integrated Pest Management (IPM) programmes spearheaded by the Plant Protection Service (PPS) since the 1970s and operationalized by the central government, with the support of the provincial set up from 1987, have so far paid good dividends by managing these pests with least chemical inputs. Almost all farmers food crop sector depend on herbicides at present as labour is expensive and hard to find. After restricting the use of the herbicide Paraquat in 2008 and its subsequent ban in 2014, Glyphosate that was extensively used in rice was also banned officially 2015. However, counter brands of Glyphosate are said to be unofficially available and used widely by farmers. Heavy use of herbicides in paddy cultivation is highlighted during the crop institutional survey (please see Figure 1.1).

Many rice production systems even in small farmer settings have come to rely on herbicides. However, costs of chemicals escalate and the need to reduce production costs and environment costs is needed. The evolution of new weed problems and herbicide resistant ecotypes suggests there should be greater emphasis on the judicious use of herbicides, integrated with cultural methods. Mitigation of herbicide use in paddy cultivation is reportedly possible by transplanting rice seedlings. New techniques such as parachute seedling broadcasting introduced by the DoA promise reduction of herbicide use. The PPS has major responsibility to promote IPM technologies for weed control in rice. Comprehensive programmes have to be developed in consultation with RRDI and spearheaded and monitored by the PPS.

1.2 OFC and spice crops sector

The OFC and spice crops sectors (latter is the main responsibility of the Department of Export Agriculture) have continued to struggle because of the unstable food import policy. Potato and onion have gained political importance because of the relatively high profits as a result of market imperfections and numbers of farmer families who are concentrated in growing those crops. Potato has caused many quarantine problems because of contaminated seed potatoes of external origin and have resulted in increased use of pesticides for their control. The environment cost of potatoes cannot justify cultivation of the crop in Sri Lanka.

The OFCs in the dry zone face several weed problems, which require extensive use of herbicides.

1.3 Vegetable sector

The vegetable sector is fairly stable with the plant quarantine laws that do not permit import of fresh vegetables. However, imports of seeds (especially the hybrids) as planting materials has increased since more liberal economic policies were adopted by the government since 1978. Exotic pest prevalence has increased with seed import liberalization. As a consequence, the import of pesticides to manage these pests has also increased. However, mid and low country areas specialize in growing local vegetable varieties including leafy types and the use of pesticides is relatively low.

The sector is most vulnerable to the impact of climate change which disrupts the production and market stability. Environment and food safety issues dominate this sector especially in the upcountry scenario as a result of heavy use of chemical fertilizers and pesticides (Table 1.1). Quarantine under the PPS has special roles to mitigate foreign pest introductions so that pesticide use could be minimized and food safety could be improved. This is one of the important reasons this review is proposing to place the NPQS directly under the PPS.

1.4 Fresh fruits sector

The fresh fruit sector has been compromised by import of exotic fruits, which affects the demand for local fruits. Additionally, fruit imports have led to serge in quarantine pests, in particular, exotic fruit flies and scale insects. Use of chemical control measures against these new pests could affect export certification and local food safety.

1.5 Coconut

Coconut is increasingly facing pest outbreaks. The **Weligama Coconut Leaf Wilt** disease

(WCLWD) is significant and is caused by a phytoplasma. Insect pests occur regularly and are actively controlled by the CRI/CCB with strong farmer awareness programmes. Given below are examples of significant insect pest management programmes.

Progress of crop protection in coconut (Table 1.1)

Name of the pest	Frequency of occurrence during last five years	Control measures adopted	Present status of the pest	Comments,
Red palm weevil, *Rhynchophorus ferrugineus*	Year around occurrence in every year	a. Estate sanitation (Maintaining clean plantations, cleaning of trunks, minimizing wounds on palms, removal of damaged/dead palms, application of coal tar or burnt engine oil on wounds) b. Mass trapping of adult weevils using pheromone traps c. Chemical control (Monocrotophos, Phenthoate, Chlorantraniliprole + Thiamethoxam)	Major pest	
Black beetle *Oryctes rhinoceros*	Year around occurrence in every year	a. Estate sanitation (removal of breeding grounds, maintaining of thin layer of mulch) b. Extracting beetles using metal hooks c. Chemical control (naphthalene balls, burnt engine oil, Carbofuran) d. Biological control (*Metarrhizium anisopliae*, *Oryctes* virus) e. Mass trapping of adult black beetles using pheromone traps	Major pest	
Coconut mite *Aceria guerreronis*	Year around occurrence in every year	a. Chemical methods (Palm oil and sulphur mixture) b. Biological control (Predatory mites, *Neoseiulus baraki*)	Major pest	Severity and occurrence is higher in dry- and intermediate zones
Coconut caterpillar *Opisina arenosella*	Year around occurrence in every year (only in some areas)	a. Cultural methods (removal of fronds in mild infestations) b. Biological control (parasitoids)	Major pest	
Plesispa beetle *Plesispa reichei*	Year around occurrence in every year (only in some areas)	Chemical control (Carbosulfan)	Major pest	
Coconut Scale *Aspidiotus destructor*	No large outbreaks during last five years.	Mechanical control (scrapping out)	Minor pest	This pest is naturally controlled by *Chilocorus nigritus* and *Pullus xerampelinus*.
Nettle grub *Parasa lepida*	No large outbreaks during last five years	-	Minor pest	Naturally controlled by predators.

Termites *Odontotermes horni*, *Nasutetermes ceylonicus* *Odontotermes* sp.	Year around occurrence but no large outbreaks in the last five years. Common in nurseries.	Cultural control Chemical control (Imidacloprid)	Minor pest	
Bag worm (*Manatha albipes*	No major outbreaks during last five years	Mechanical control (Hand collection)	Minor pest	Naturally controlled by predators.
Yellow spotted locust (*Aularches miliaris*	3 minor outbreaks in isolated pockets	a. Non-chemical methods b. Chemical control (Carbosulfan)	Minor pest	
Mammalian pests (rats, bandicoots, porcupines, wild boar, giant squirrel, toque macaque)	Sporadic reports in few areas	Traps, baits and barriers	Minor pests	

Source: Entomology Div. CRI

1.6 Pesticide use intensity for various crop categories in Sri Lanka

Comparative information of pest prevalence and the status of pesticide use for their management in Sri Lanka was composed and presented here as easy reference material. Data was collected from the institutions responsible per crop group as Opinion Poll Feedback and is presented below in Figure 1.1

Figure 1.1 Opinion Poll Feedback of Pesticide Use on Crops

	Weedicide	Insecticide	Nematicide	Rodenticide	Acaricide	Fungicide
DOA mandated Crops (n = 8 -10)						
Paddy						
Coarse Grains						
Grain Legumes						
Condiments						
Oil seeds						
Root & Tubers						
Up country Vegetables						
Low Country Vegetables						
Leafy Vegetables						
Fruits						
DEA Mandated Crops (n=13)						
Spices Gp I Perennial spices						
Spices Gp II Perennial spices						
Annual Spices						
Beverage crops						
Arecanut						

Betel						
Mandated crops of Other Organizations						
Coconut (n = 6)						
Rubber	NA	NA	NA	NA	NA	NA
Tea (n = 7)						
Sugar	NA	NA	NA	NA	NA	NA
Ornamental Plants (n=7)						
Red - heavy use > 3.5						
Orange - Moderate use 3.49 – 2.5						
Blue - Light use 2.49 – 1.5						
Green – none < 1.49						

Key: High use > 3.5
Moderate use 3.49 – 2.5
None use < 1.49

NA: Not Available.

Rubber Research Institute and Sugar Research Institute are two important national organizations which failed to respond to the survey.

Notes:

1 Heavy use of pesticides are reported only for DOA mandated crops namely paddy (mostly weedicides), condiments and upcountry and low country vegetables (insecticides and fungicides). Fruits sector under the DoA is using low chemical inputs.

2 It is necessary to scale down chemical inputs and move from heavy use to moderate and low use or appropriate use with a coordinated extension programme. Spearheading this responsibility lies with the PPS. Currently, the PPS plays minimum roles even in making recommendations for pesticides when it should play the lead role in decision making regarding pesticide usage for every crop in the country including plantation crops.

3 Apparently, the plantation sector and spice sector use minimum pesticides. This fact if published should be a boost for exports of these crops. However, it would be useful to carry out statistically valid, detailed studies in order to derive validated scientific information for export market development.

Use of weedicides in rice cultivation could be reduced by transplanting paddy seedlings and/or sowing varieties which produce robust seedlings with many tillers that would smother germinating weed seeds. Efficient seedling transplanters and mechanized weeders should also be introduced and promoted. Such exercises should be fostered by coordinated action between RRDI, PPS and FMRC.

Chapter 2 - Background of the institution

This chapter describes the historical development of the PPS, its glory days, present status on staff, financial strength and management.

Brief history of the Plant Protection Service

2.1 Development of the Plant Protection Service

Coffee leaf rust in the 19th century prompted the then British government to develop a body for providing research back stopping in Entomology and Mycology. As a result, a "Plant Pest and Disease Inspection Division" (PPDID) was created in the DOA in 1919 just seven years after the creation of the DoA to liaison with the services between Plantation Sector and the Division of Entomology, Mycology and Botany of DOA. In 1942, PPDIP was entrusted with implementation of the Plant Protection Ordinance (PPO) No. 10 of 1024. In 1953, the 'Pest and Disease Extension Service" (PDES) was launched with Canadian assistance. The PDES was given the responsibility on advisory work in plant protection under the Division of Agricultural Research. The PPDID developed into the PPS in 1959 with a cadre of nine Agricultural Instructors (AII) stationed in the nine provinces at that time. In 1968, the PPS was expanded to cover 22 districts existing at that time, when the internal plant protection under PPO commenced.

The DoA initiated activities in 1946 to promote pesticide use (e.g. DDT and MCPA) and continued to have the monopoly to import and distribute pesticides until 1962.

2.2 Milestones of operation of PPS in Sri Lanka

- 1962: Private sector was granted permission to import pesticides
- 1964: Establishment of Formulating Committee for agrochemicals
- 1974: Free issue of pesticides to control BPH in major rice growing districts
- 1977: PPS placed under the division of Education and Training of DOA
- 1979: PPS placed under the division of Extension and Training of the DOA
- 1989:PPS placed under Seed Certification and Plant Protection Centre of DOA

2.3 Mandate of PPS

The mandate of the PPS revolves around regulatory activities within the country stipulated by the Plant Protection Act No. 35 of 1999. The act helps in protection of crops and other plant species by promoting the management of pests and preventing invasive alien species being introduced to the country. With powers vested by the said act, PPS had become the

legal authority for coordination of plant protection-related activities in Sri Lanka. To facilitate the plant protection activities in Sri Lanka, Authorized Officers have been recently appointed by the Director General of Agriculture to the PPS and National Plant Quarantine Service (NPQS). These officers have been formally trained in relation to the act, quarantine pests, invasive alien species (IAS), integrated pest management (IPM) strategies, etc. to strengthen the services rendered to the society.

2.4 Plant protection strategies being implemented

Plant Protection strategies begin with the prevention of entry of alien pests into the country through quarantine strategies followed by deterrence of their establishment and spread through pest management. Realizing the need for integrated operations in plant protection from entry point to field level, the PPS was given the responsibilities in the past for all matters on the subject, i.e. entry point control and post-entry quarantine and pest management throughout the country. Parallel to these developments, legislative acts such as the Water Hyacinth Ordinance No. 4 of 1909 and PPO No.10 of 1924 empowered the then Director of Agriculture who designated the PPS for implementation of plant protection activities on his/her behalf.

The mandatory tasks of the PPS covered plant quarantine including issue of permits for import and export of plant products, entry point quarantine, post-entry quarantine, pest declaration/notification and gazetting, fumigation of food and stored products including seeds, control of declared pests in the country including Salvinia, Water Hyacinth, Parthenium, and Fall Army Worm, and importation and mass rearing of biological pests. Other declared pests are actively controlled by respective government institutions such as the Coconut Research Institute (Weligama wilt disease in Coconut), RRI, TRI, SRI and the Mahaweli Authority of Sri Lanka and Department of Irrigation (Giant mimosa plant) in collaboration with the PPS. In the recent months, the new pest Yellow Spotted Grasshopper has received national attention and the PPS has participated actively in their control. Thus, the PPS was the premier national focal point armed with the necessary legislation to fulfill its mandate.

The glory days of PPS were seen in the 1970s when the FAO supported the development of nation-wide integrated pest management (IPM) programmes focused on paddy with a full-blooded cadre of dedicated PPS staff. The programme won international praise for minimizing pesticide use in the crop in Sri Lanka with paddy farmers continuing to benefit from use of IPM to date. However, the visibility of the PPS as the pivotal national organization responsible for all plant protection activities has eroded during the past four decades.

2.5 Present day challenges

Despite strict plant quarantine, many important pests have entered the country. All three categories of pests, namely, insect pests, pathogens and weeds of alien origin have appeared in the Sri Lankan landscape. Entry of plant products without adhering to the procedures prescribed by the National Plant Quarantine Service (NPQS) and undetected contamination of imported plant-based materials/products through international trade, transport and tourism, and international aid could be the main reasons for such entry of unwarranted pests that affects the ecosystems in the country. Some have been actively controlled depending on the state of virulence of the pest and economic damage caused while others continue to exist in the environment, posing continuous challenges to the PPS.

2.6 Vision and Mission Statements of the PPS

Vision and mission of Plant Protection Service as presented in the official website (https://www.doa.gov.lk/SCPPC/index.php/en/institute/32-pps-2) are given below. Vision of the PPS is a derived from the Vision of the Department of Agriculture, i.e. Achieve Excellence in Agriculture for National Prosperity

2.6.1 Vision of PPS

Achieve excellence in agriculture through safe and effective Plant Protection Strategies

2.6.2 Mission Statement of PPS

Adopting the provisions of the Plant protection act No.35 of 1999 while promoting effective pest management strategies which cause least harm to the environment ensuring protection of local Agriculture.

2.7 Goals and Objectives of PPS

The goals and objectives of the PPS as presented in the self-assessment report of the PPS are as follows;

2.6.3 Goal

Protection of crops and other flora from dangerous pests (animal pests, disease and weeds) by prevention of establishment and spreading within the country.

2.6.4 Objectives

(1) Protection of flora
(2) Minimize the use of pesticides in crop production
(3) Timely management of Invasive Alien Species (IAS)
(4) Efficient household pest management

2.8 Organogram of Department of Agriculture and Positioning of PPS

Three Additional Directors of Agriculture, a Chief accountant and a Chief Engineer assists the Director General of Agriculture (DGA) in management of the Department of Agriculture. Of the five 2nd tier officers, two are technical officers managing research and development activities while the rest handles the support services, namely, administration, finance and engineering. According to the organogram of the DOA, the PPS is identified as a development activity (Figure 2.1), while the PPS is listed under the purview of the Seed Certification and Plant Protection Centre (SCPPC).

2.9 Organogram of Seed Certification and Plant Protection Centre (SCPPC) and authoritative powers of the Head of PPS in comparison with Heads of other units

The PPS comes under the direct supervision of Director of SCPPC, and is headed by an Additional Director (Figure 2.2). It has two sub units at MahaiIuppallama and Bombuwela representing the Dry and Wet Zones, respectively. By 2018, the Bombuwela sub-station was virtually non-functional owing to lack of staff.

2.10 Additional legislation supporting plant protection in Sri Lanka:

Following two enactments made by the Parliament of Sri Lanka also make provisions for the sanitation of plants and regulate the introduction and spread of organisms harmful to existing flora of the country.

(a) The Fauna and Flora Protection Ordinance, No.2 of 1937 (as amended),
(b) Seed Act No. 22 of 2003

Despite the legislative powers and high responsibilities attributed to the PPS, it is in a lackadaisical state at present due to lack of recognition as an important national organization needing a wider mandate, leadership, cadre and motivation.

2.11 Infrastructural Facilities

The headquarters of PPS is located at Gannoruwa, next to the SCPPC. This makes the management convenient as per the organogram presented in Figure (2.2). The PPS head office comprise an office, stores, garages and Driver's room. It is provided with IT and communication facilities, furniture, equipment and vehicles (Annex 03)

2.12 Existing cadre position in PPS to serve stakeholders

Following data on human resources available at PPS pertains to the year 2018. The situation in 2020 is virtually identical or worse.

Figure 2.1 Organogram of Department of Agriculture

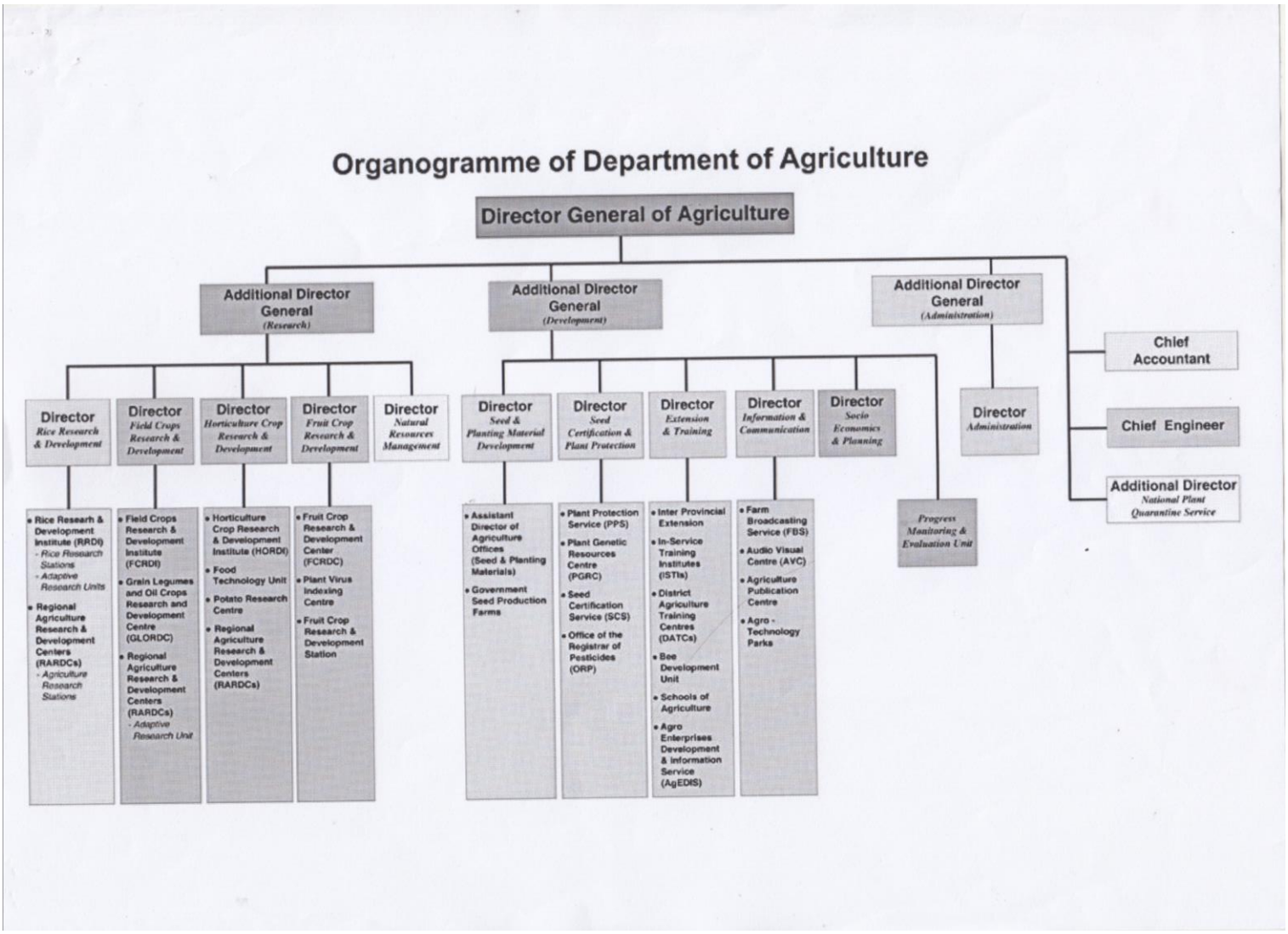
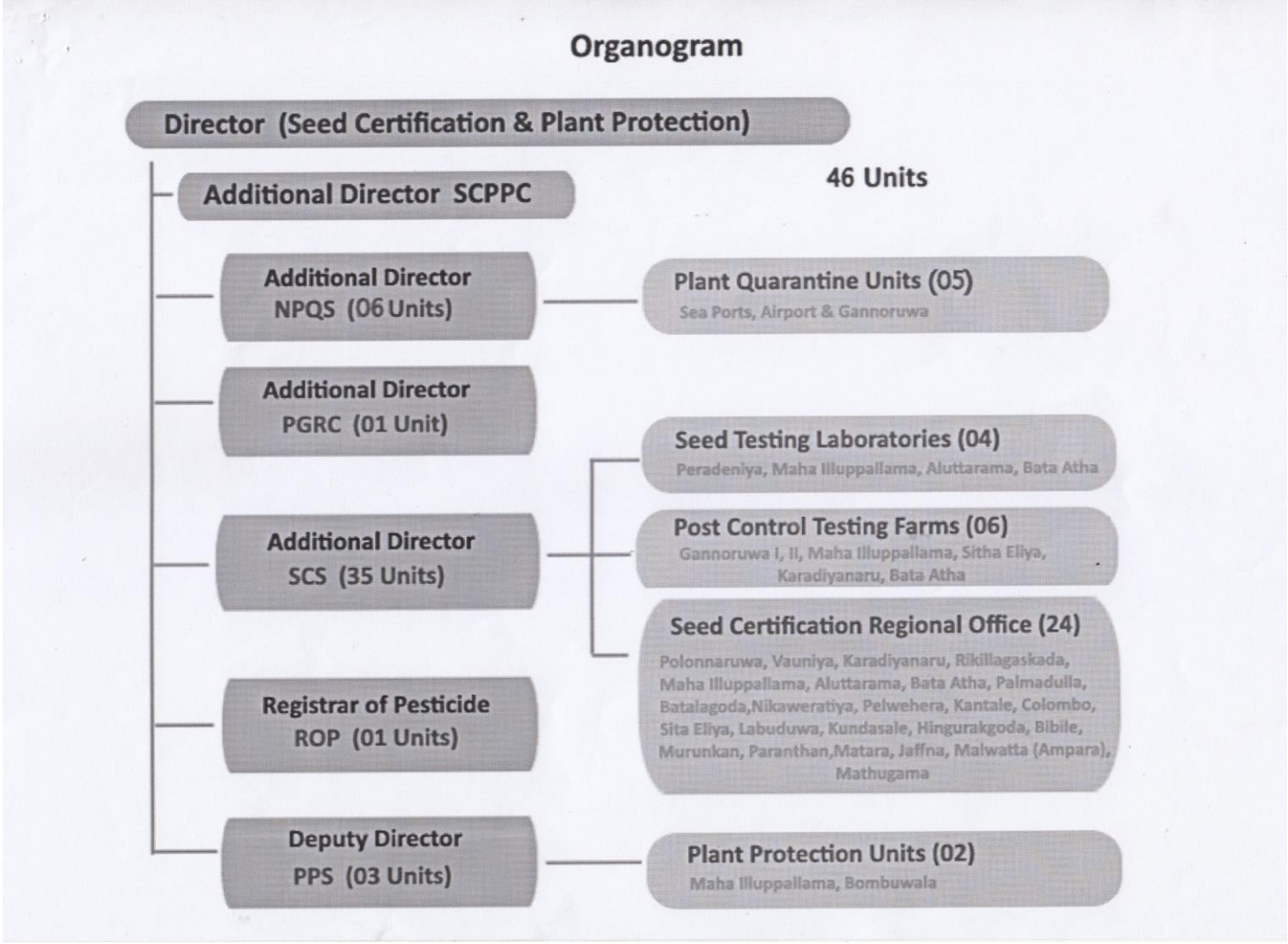


Figure 2.2 Organogram of Seed Certification and Plant Protection Center.



The PPS which had control of the NPQS entry point quarantine duties in the past is now confined to internal plant protection. A single field station exists at Mahailluppallama.

Table 2.1. Staff position (technical grades only) of PPS as of March, 2018

Title	Approved cadre	Available cadre	Vacancies	Excess
Additional Director	1	0	1	
Deputy Director	9	0	9	
Asst. Director (Ag. Development)	11	1	10	
Asst. Director (Ag. Research)	2	0	2	
Development Officer	1	1	0	
Programme Assistant	0	0	0	
Agricultural Instructor	5	4	1	
Technical Asst. (Extension)	0	1	0	1

Key positions at the top of the hierarchy (ref. Table 2.1. Staff positions for Additional Director, Deputy Director, and Assistant Directors) have not been filled for many years. Therefore, the organization is without key managers and is floating rudder-less. It is futile to expect the decimated organization to serve the national requirements in plant protection. The numerous stakeholders including farmers, business personnel, plantation sector, export agriculture, national research organizations, TRI, RRI, SRI, CRI, etc., would lose confidence in the organization as it is expected to perform a pivotal scientific role in the national concern of plant protection. Given the increasing threats by pests and diseases as described above, in an open global market situation where agricultural product exports are needed to satisfy increasingly stringent food safety standards, plant protection plays the most vital role to ensure health standards of the growing crop and its products. Local consumers are also progressively sensitive to product quality with regard to plant protection chemicals. Climate change is also increasing the threat from pests. Therefore, the importance of plant protection with conscious efforts to conserve food safety needs of local and foreign consumers need steadfast commitments.

Further, the global movement of plant products through airlines and ships has increased with the liberalization of economies enhancing the chances for new pest introductions. The need for a strong plant protection organization to safeguard from the threats is the need. Therefore, the Review Team emphasizes the responsibility of the authorities to address the cadre issues of the national PPS organization immediately.

2.13 Human Resources in the PPS

The staff for PPS for the three year period 2016-2018 is given in Table 2.2. Nearly 50 % of the total cadre positions at the PPS are vacant as at present. More importantly, the S & T category suffers critically, with nearly 84 % vacancies during the period of review. The relative situation with administrative staff and technical staff were satisfactory. However, in 2018 the technical carder too had suffered a setback with increase in number of vacancies. The support staff too are a vital part and contributors

for smooth functioning of the organization. The vacancies under this category has also increased from four to six over the period of review leaving 33 % cadre to be filled. All S & T staff members have a basic degree or higher academic qualifications (Table 2.3).

Table 2.2. Staff Position in Relation to Approved Cadre (2016 to 2018)

Staff Category	2016				2017				2018			
	Cadre	Number filled	Vacancies	% vacancies	Cadre	Number filled	Vacancies	% vacancies	Cadre	Number filled	Vacancies	% vacancies
S & T	26	4	22	85	26	4	22	85	26	4	22	85
Administrative	4	4	0	0	4	3	1	25	4	4	0	0
Technical	13	11	2	15	13	11	2	15	13	8	5	38
Support	19	15	4	21	19	14	5	26	19	13	6	32
Total	62	34	28	45	62	32	30	48	62	29	33	53

Source: Performance Reports of Department of Agriculture (2016, 2017 and 2018)*

Table 2.3. Summary of Qualifications of S & T staff

Qualification	2016	2017	2018
Ph. D.	0	0	2
M.Phil.	0	0	0
M.Sc. or Equivalent	2	2	1
Basic Degree or Equivalent	2	2	1

2.14 Fund Allocation and disbursement

The PPS has received funds through two separate modes *viz*., (a) allocation for the normal recurrent and capital expenditure, and (b) allocation for special projects, namely, National Food Production Programme (NFPP), where both allocations are from the government treasury. During the three-year review period, the recurrent allocation has increased from LKR million 2.33 to 3.10 (Table 2.4), to accommodate the increased remuneration of officers. The capital allocation too has improved from LKR million 1.95 to 4.70 (Table 2.5). However, the expenditure of capital allocation has dropped from 84 % to 71 % during the period of review, while in absolute terms reveals an increase in 2018. Funding through National Food Production Programme (NFPP) has also dropped drastically in 2017 compared to that of 2016 and had remained more or less stable in 2018. Disbursement from this allocation too has decreased in both absolute and relative terms in 2018 (Table 2.6).

Table 2.4 Recurrent Allocations Received and Disbursed During 2006-2018 (LKR million)

Vote	2016			2017			2018		
285-02-04-0-	Allocation	Expenditure	% Spent	Allocation	Expenditure	% Spent	Allocation	Expenditure	% Spent
1001-Salaries & Wages	0.10	0.08	80	0.15	0.14	93	0.38	0.23	61
1002-Overtime & Holiday pay	0.25	0.25	100	0.25	0.24	96	0.70	0.52	74
1003-Other Allowances	0.16	0.09	56	0.15	0.08	53	0.45	0.16	36
1101-Travelling (Domestic)	0.40	0.36	90	0.30	0.30	100	0.30	0.30	100
1201-Stationaries & office equipment	0.13	0.11	85	0.15	0.08	53	0.12	0.08	67
1202- Fuel & Lubricants	0.40	0.39	98	0.40	0.36	90	0.40	0.34	85
1203-Diets & Uniforms	0.02	0.02	100	0.02	0.02	100	0.07	0.05	71
1205-Others	0.07	0.07	100	0.10	0.09	90	0.10	0.08	80
1301- Vehicles (Maintenance expenditure)	0.35	0.30	86	0.35	0.28	80	0.35	0.33	94
1302-Plant Machinery & Equipment	0.01	0.01	100	0.01	0.01	83	0.05	0.04	80
1303-Building & Structures	0.02	0.02	100	0.00	0.00	100	0.01	0.00	0
1402-Postal Communication	0.15	0.09	60	0.10	0.10	100	0.09	0.07	78
1403-Electricity & Water	0.26	0.11	42	0.10	0.08	80	0.08	0.00	0
1409-Other Agreements	0.02	0.01	50	0.03	0.03	100	0.00	0.00	0
TOTAL	**2.33**	**1.90**	**81.55**	**2.11**	**1.81**	**85.71**	**3.10**	**2.20**	**70.97**

Table 2.5 Capital Allocations Received and Disbursed During 2006-2018 (LKR million)

Vote	2016			2017			2018		
285-02-04-0-	Allocation	Expenditure	% Spent	Allocation	Expenditure	% Spent	Allocation	Expenditure	% Spent
2001-Maintenance of Building & Structures	1.40	1.20	86	1.00	0.67	67	2.50	2.20	88
2002-Plant Machinery Equipment	0.05	0.02	40	0.05	0.00	0	0.00	0.00	0
2003-Vehicles	0.40	0.35	88	0.40	0.35	88	0.30	0.10	33
2102-Furniture & Office Equipment (new)	0.10	0.08	80	0.10	0.10	100	0.20	0.20	100
2103-Plant & Machinery Equipment	0.00	0.00	0	0.04	0.03	75	0.20	0.10	50
2104-Building &Structures (new)	0.00	0.00	0	0.50	0.50	100	1.50	1.20	80
2105-Land & Land development	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0
TOTAL	**1.95**	**1.65**	**84.62**	**2.09**	**1.65**	**78.95**	**4.70**	**3.80**	**80.85**

Table 2.6. Summary of Financial Allocations Received and Disbursed During 2016 to 2018 (LKR million)

Vote	2016			2017			2018		
	Allocation	Expenditure	% spent	Allocation	Expenditure	% spent	Allocation	Expenditure	% spent
Recurrent	2.33	1.90	82	2.11	1.81	86	4.50	3.82	85
Capital	1.95	1.65	84	2.09	1.65	79	3.10	2.21	71
NFPP	9.36	5.25	56	1.80	1.58	88	1.50	0.55	37
Total	13.64	8.80	65	6.01	5.04	84	9.29	6.58	71

Source: Performance Reports of Department of Agriculture (2016, 2017 and 2018)

Chapter 3 - Procedure adopted for performance review

An inception meeting was held on 30th October 2019 at the Plant Genetic Resource Centre (PGRC) where the officials from the NASTEC introduced the review process to the committee. Dr. S. L. Weerasena was selected as the team leader. At the first meeting, in the presence of the officers of the NASTEC, the team discussed and agreed upon the following process.

1. Regular Team meetings to discuss the progress and plan subsequent actions.
2. Meetings with the PPS staff – group meetings & meetings with individual members.
3. Key stakeholders meeting - a group meeting with all the stakeholders with 60-70 invitees having different roles.
4. Meetings with the Director of the SCPPC and staff.
5. Collect all the documentary evidences from different places.
6. To visit operational units of PPS if required.

3.1 Team Meetings

The team members met 12 times during the review process. Majority of the meetings were held at the board room of the PPS at Gannoruwa and at the Agricultural Biotechnology Centre of the Faculty of Agriculture, University of Peradeniya located ta Meewatura. The team planned the focused discussions and summarized the outcomes of previous discussions during regular meetings. The team also communicated regularly via emails.

3.2 Meetings with the staff of the PPS

At the first meeting with the PPS staff, Dr. Dayani Perera the Additional Director of PPS provided a comprehensive overview of the PPS and its main activities, current issues and future directions. The other staff members provided their inputs, individually and as a group. The staff provided all the available documents as and when requested. The Additional Director of PPS and the staff were cooperative throughout the process.

3.3 Meeting with the Key DOA Officials

The committee met the following key officials individually. All the meetings were well-focused and the discussion points were considered positively and incorporated in the report. All the relevant documents were also collected from visited offices.

i. Director General of Agriculture
ii. Director of the SCPPC

iii. Additional Director General (Research)
iv. Additional Director General (Development)
v. Director of the HORDI
vi. Officials of the HORDI – Research Officers and other relevant staff

3.4 Stakeholder Meeting

Both team members and PPS staff were heavily involved with organizing the stakeholder meeting. Key stakeholders were identified and listed. Following categories were considered and the number of officials to be invited from each group varied depending on the size.

Table 3.1. Key stakeholder groups of PPS and number of invitees for the workshop

Group	**Number**
Private sector	03
DOA scientists	10
Provincial level officers	22
Other DOA officials	10
TRI, CRI, Plantation ministry, Biodiversity Mahaweli, Irrigation, Export Agriculture, Botanic Gardens, DAPH	12
Retired officers from DOA	4
Universities	10
Total	71

A formal invitation letter was sent to the Heads of Institutions by the NASTEC requesting nominations from the identified officer categories. All the Heads of Institutions were also contacted on the phone for the same purpose. After receiving formal nominations, prospective participants were contacted on the phone to remind and confirm attendance at the workshop.

The review team developed a questionnaire with questions in four main categories.

A: Stakeholder responsibilities.
B: Responsibilities of the PPS as seen by stakeholders.
C: Actions necessary to streamline and facilitate interactions between PPS and all its Stakeholders.
D: What new national policy initiatives (acts and regulations) are needed to improve pest management in Sri Lanka.

The questionnaire adopted to collect information from the stakeholders is given in Annexure 3.1
The stakeholder meeting was held on 20th November 2019. Each participant received a folder at the entrance with a copy of questionnaire, Plant Protection Act No. 35 of 1999, and other relevant documents. After a formal welcome, the Dr. Dayani Perera

(Additional Director PPS), provided an overview of the PPS services, including mandate, current services, problems encountered, future directions, etc. After introducing the purpose of the meeting, the participants were grouped into five groups. The team allocated the groups based on their role with the PPS.

Group 1: Private sector and retired DOA officers
Group 2: Universities and DOA scientists
Group 3: DOA Officers
Group 4: Other government institutions
Group 5: DOA Directors, Additional Directors and retired DOA Officers.

The members allocated to each group are listed in Annexure 3.2. Each group had an allocated space, a laptop computer and clip board, papers and pens to discuss matters. A leader was appointed to each group and the team member assigned for each group to summarize the task given to the group. A staff member from PPS was also allocated to each group to provide any assistance where needed.

Accordingly, the first 30 min. was allocated to fill the questionnaire individually, prior to discussion among group members. Thereafter, 1.5 hours were allocated for the group discussion, and at the end of the discussion, each group collectively filled the same questionnaire again (i.e. one filled questionnaire per group). Each team either prepared a poster or a PowerPoint presentation summarizing the contents of the discussion. The leader appointed for each group made a presentation to the audience and all participants contributed to the discussion.

3.5 Post-workshop Analysis

All questionnaires filled by individuals and groups were collected, and the results were tabulated. Individual and group questionnaires were considered separately. During the analysis, similar ideas were grouped and discussed separately in this report. The team members studied the documentary evidences collected during the process and the contents were included when and wherever needed.

The team first prepared and agreed upon the draft format of the report and everyone contributed in the writing process. The first draft was submitted to NASTEC with the approval of all review team members.

3.6 Feedback from Crop Research Institutions

The following crop research institutions were contacted to update pest information, mitigation methods and current status of pests under their domain. Questionnaires were designed to elicit the required information (Annex 01). Findings are incorporated in this document.

Participation organizations:

1. Coconut Research Institute
2. Rubber Research Institute
3. Sugar Research Institute
4. Horticulture Research and Development Institute
5. Rice Research Institute
6. Field Crops Research and Development Institute
7. Fruit Crops Research Institute
8. Tea Research Institute
9. Department of National Botanic Gardens
10. Department of Export Agriculture

Chapter 4 - Assessment of Management Practices

This chapter highlights the evaluation of the management practices and procedures followed at PPS. While the self-assessment Report (SAR) had some information summarized, the team gathered detailed information needed to complete the review. As highlighted in NASTEC Review Manual, the following aspects of management were assessed:

I. Institutional response to external and internal environment in planning organizational strategy
II. Planning S & T Programs and priorities
III. Planning S & T/ R & D Projects
IV. Project management and maintenance of quality
V. Human Resource Management
VI. Management of organizational assets
VII. Coordinating and integrating the internal functions/ units/activities
VIII. Managing information dissemination and partnership
IX. Monitoring, evaluation and reporting

As suggested in the Review Manual, some of the aspects listed above were modified to suit the specific institution. For example, some programs listed in the SAR were considered as projects in the case of PPS.

Each management practice listed under the different aspects was assessed based on the Table 4.1 and the most appropriate response was indicated by placing a cross (x) in the relevant cage. The comments/evidences were noted as a basis for identifying good management practices as well as weaknesses. The written evidences are cited as in the order of their appearance and given as Annexures at the end of the report

Table 4.1. Assessment criteria of responses

(1) Always used/ always considered/ involved/analyzed	≡	**Strong**
(2) Occasionally used/ considered/ involved/analyzed	≡	**Moderate**
(3) Not used/ Not considered/ Not involved/Not analyzed	≡	**Weak**

4.1 Assessment of Institutional Response to External and Internal Environment in Planning Organizational Strategy

The external environment of PPS includes mainly the industry, research staff, farmers, and different partners. The performance of PPS critically affects implementation of the PPO. Further, the external environment for PPS is unpredictable owing to emerging pests and pathogens and introductions of such organisms through various pathways. The stakeholder conditions and needs also change with emerging issues. Therefore, it is important for PPS to be ready to address the emerging issues as well as prepare long term mitigation programs, periodic situation reviews and continuously adjust its directions and goals, in order to meet these changes. These adjustments in turn may require significant actions, such as frequent stakeholder consultations, changes in focus and programs, improvements in organizational structure, and management strategies.

The yearly program, physical and financial prepared by the Additional Director of PPS (AD/PPS) is submitted to the DG/Agriculture through the Director/SCPPS. If the funding is from an external organization, the DG/Agriculture will in turn submit the proposal to the relevant institution through the Secretary to the Ministry responsible for the subject of Agriculture. The reporting also includes the progress of some activities related to the NFPP that were carried out by the PPS.

The financial and physical progress are monitored monthly through the reports submitted by the AD/PPS, and the yearly progress is included in the Annual Performance Report of the DOA, which is reviewed, printed and published at the end of the year. In the yearly technical and financial action plans, the organizational activities of PPS have been identified as follows:

1. Implementation of PP Act
2. Promotion of IPM-training
3. Technical assistance to rodent management in rice fields
4. Biological control of invasive aquatic weeds
5. Identification and management of alien invasive species
6. Pilot scale testing of weedicides / termiticides
7. Seed fumigation in DOA's seed production farms
8. Termite control activities in DOA buildings
9. Permanent crop clinic program
10. Pest surveillance program
11. Technical assistance to management of pests in special premises and historically important tree conservation programs
12. Management of pest outbreak programs
13. Exhibitions, mass media programs
14. Preparation of training materials and publications

Annual progress is also monitored and reported under above activities. In this regard, the

following evidences are included in this review report as supporting documents'

- ✓ Progress of technical action plan -2018 (Annexure 4.1)
- ✓ Relevant pages of Performance report of the DoA – 2016, 2017 and 2018 - (Annexure 4.2, Annexure 4.3, Annexure 4.4)

Table 4.2. Institutional response by PPS to external and international environment in planning the organizations strategy during the three year period of review 2016-2018

Management practice	**Level of Practice (Performance Indicators)**			**Comments / (Evidence)**
	Strong	**Mode rate**	**Weak**	
Government policies and development goals are used/ considered to establish goals and plan organizational strategy for the institution			x	Based on the evidences, activities/mandate of the institution but not the government goals are considered.
The organizational mandate (as specified by the relevant Act) is considered in strategic planning		x		Implementation of PP act has been identified as the main activity of the organization. However, no improvement was seen over the considered period. Instead, some activities relevant to the implementation of the act (ex- seed fumigation unit) have dropped
The institution is responsive to changes in Government policies and strategies		x		The government policies have not changed during the considered period. The Good Agricultural Practices (GAP) introduced has been considered in training
Factors such as strengths, weaknesses, threats and opportunities are considered in strategic planning		x		Only the weaknesses are considered in the strategic planning. For example, limited staff has been identified as a weakness and activities are planned accordingly.
Stakeholders needs are taken into consideration in strategic planning			x	No evidence for proper stakeholder consultations.
The Board of Governors is involved in strategic planning	x			Yearly plans are finalized at the Directorate and DG level.
The extent to which staff members are involved in strategic planning		x		Yearly physical plan is prepared in consolation of the staff. No evidence for involvement of MI and Bombuwala
Government allocations and alternative funding opportunities (donor funding) are considered in strategic planning		x		Only the government allocations are considered. However, the annual reports indicate the utilization of CABI funding for training.
The extent to which policies and plans of the organization are reviewed and updated			x	No updates during considered period

Further to the emergency responses in pest outbreaks, no regular assessments have been done by the PPS during the three-year review period to plan and to respond effectively to challenges and to deliver results that are relevant and useful. Opportunities available were not exploited and some responsibilities are transferred to the other divisions.

4.2 Planning S & T Programs and Setting Priorities

Each program is an organized set of activities that are oriented towards achieving specific objectives set initially. Nevertheless, as for the SER, the PPS has identified following as its S & T programs (Ref: SAR: page 6-8).

(i) Implementation of Plant Protection Act No 35 of 1999
(ii) Promotion of Integrated Pest Management (IPM) packages for rice, vegetables, fruits and other field crops
(iii) Permanent Crop Clinic Program
(iv) Technical Assistance in Field Rat Management
(v) Technical Assistance to Control Invasive Alien Weed Species
(vi) Biological control program for Aquatic weeds
(vii) Pilot scale testing of herbicides/termiticides
(viii) Technical guidance to manage termites in DOA premises
(ix) Technical Assistance in Fumigation of Seed Storages of DOA Farms
(x) Pest outbreaks
(xi) Pest surveillance programmes

Following information is provided for each program (Ref. SAR: page 08-11):

- ✓ Objective
- ✓ Relevance to organizational mandate
- ✓ Relevance to national needs
- ✓ Total budget and source of funding
- ✓ Outputs

Progress of the programs is reported in the Annual Performance Report of the DOA under the same or similar topics. The review team collected documentary evidences including annual reports, program plans and progress reports. Further, information was collected during the group discussions with the staff of PPS. Table 4.3 summarizes the progress under this segment.

Table 4.3. Progress in planning S&T programs and setting priorities

Management practice	Level of Practice (Performance Indicators)			Comments/ Evidence
	Strong	Moderate	Weak	
National development goals are considered in planning programs & setting priorities		X		GAP has been included in the IPM program

Board of Governors participate in planning and priority setting of program	X			All activity plans are submitted to the DG through the Director SCPPS
The extent to which the staff of the institution participate in programme planning and priority setting		X		The available staff is allocated to each program. Ex: AD (Development) coordinates the IPM training programs. A contract RO is handling the pilot testing program. However, no evidence for involvement of regional centres in any program was noted.
Stakeholder interests are considered in programme planning		X		No program evaluations are done. However, officers involved informed the team that they discussed with the participants at the end of the program and field level officers also have an idea about stakeholder needs
The extent to which programmes are planned and approved through appropriate procedures		X		The annual physical plan includes the regular programs. Number planned and target groups and the progress is reported at the with the "Progress of technical action plan"
The extent to which the availability of funds (government allocations and other funds) generating funds are taken into consideration in planning programmes	X			No funds are generated through the programs since those are offered free. The financial allocations (both capital and recurrent) are
The obtaining of necessary equipment is considered in planning programmes		X		Individual officers involved in programs have considered their requirement at the planning stage
Sstakeholders are represented in the institution's planning and review committees.			X	No reported evidences
The extent to which socio economic and commercialization of aspects are considered in programme planning.		X		Only the routine activities are included in the planning stage (yearly plan). However according to the annual report 2018, a patent has been filed for Diamond back moth control protocol and artificial diet formulation
Effectiveness and efficiency of institutional procedures in approving new S& T programmes.			X	No new programs are proposed during the considered period

All the programs identified during the review are routine activities of the PPS. The scale of operation of the programs has differed in each year of review. Progress of the technical action plan shows that the financial allocation, which is to be completed according to the approved technical action plan. While some of the programs are offered as required, others are planned quarterly. In 2018, the PPS had an annual target of training 100 new authorized officers and have trained 144 by December 2018. However, in some of the programs, PPS has failed to reach expected targets. No reported involvement of regional centers were observed in any of the programs listed.

4.3 Planning S& T / R& D Projects

The PPS is a service-based institution and research is not a priority. Except for a project funded under the NFPP, no other projects have been initiated in the SAR during the three-year period of review. Nevertheless, a project is a set of activities designed to achieve specific objectives within a specified period of time. A project includes interrelated research activities or experiments, schedule of activities to be completed within a specific time period, budget, inputs and outputs, focused towards intended beneficiaries. As such, the Pilot scale testing of herbicides and termiticides could be considered as projects. For example in year 2018, the PPS has planned to test the bio-efficacy of four herbicides in farmer fields (pilot scale testing) and they have achieved the target. The process is described below.

The Agro-pesticide Sub-Committee, chaired by the Additional Director General (Research) of the DoA consists of representative officials and scientists. The ROP is the Secretary of the committee. Chemical importers submit their applications to the committee, which evaluates the information presented by the researchers at the respective institutes based on their scientific research, information available in the literature on acute toxicity, ecological toxicity, product degradation, etc., and the decisions are made either to:

- ✓ Recommend for trial purposes or
- ✓ Not to recommend for trial purposes

According to the requests made by the applicants, the pesticides are divided into different groups and depending on the experimentation chart scheduled and conducted by the Department of Agriculture, either full scale research experiments or pilot scale experiments or both will be conducted under the recommendations of the Agro-pesticide Subcommittee.

After the trials were conducted at the farmer fields by the PPS officers, the bio-efficacy

data of products are presented to the sub-committee. Considering the data presented by the representative officer, the sub-committee decides to whether to recommend the product for release. Specific recommendations and rates are also approved at the sub-committee based on the data presented. The same committee approves re-registration applications as well.

The agro-pesticide sub-committee makes recommendations considering all categories of pesticides including, fungicides, insecticides, and herbicides. However, the PPS only conducts pilot scale testing of herbicides, with no clear institutional affiliation or involvement for other categories of pesticides being tested at pilot scale. The reason attributed to only herbicide testing is reported as shortage of staff in the PPS to cover all pesticides.

At the meeting held on 19th December 2019, the Agro-pesticide Sub-Committee has approved five herbicides/formulations based on the pilot scale testing data presented by PPS (Annexure 4.5). Table 4.4 indicates the progress of level of practice adopted by the PPS in planning S&T activities including research.

Table 4.4. Level of practice adopted by PPS for S&T planning, including research

Management practice	Level of Practice (Performance Indicators)			Comments/ Evidence
	Strong	Moderate	Weak	
The staff is provided with guidance for project planning		X		One staff member (a retired officer hired on contract basis) is handling the pilot testing program
Previous research results/data are used for planning projects		X		Since this has become regular practice, previous experience is incorporated (personal communication with the officer)
The extent to which the institution follows a formal process for preparation, review and approval of projects		X		The officer in charge continues the work and the results are submitted to the Agro-pesticide Sub-Committee through Additional Director
The extent to which organizational plans (e.g. medium-term plan, corporate plan, strategy etc.) are used to guide project selection and planning			X	No clear records are available on project selection. However, currently PPS is responsible for pilot testing of weedicides. During the discussions it was evident that other chemicals were pilot tested under the preview of PPS.

Multidisciplinary projects/ activities are encouraged by the institutions		X		Some activities are conducted in collaboration and some services are offered – for example the pilot testing is done to recommend release of agro-chemicals imported by private sector as well. Some costs are born by the company. Biological control program of aquatic weeds – done in collaboration with Mahaweli Authority and Irrigation Department. PCCP training for Department of Export Agriculture. Training of officers from other organizations (Annexure 05).
Foreign collaborations are encouraged and incorporated in planning.			X	Permanent Crop Clinic Program (PCCP) is a collaborative program with the Centre for Agricultural Bio Science International (CABI) in the UK and DOA. Traditional agricultural practices for garden IP - 2016/2017 was collaborative program with the organic farming Permaculture Project, World Vision Australia.
Partnership with private sector is encouraged by the institution			X	Pilot testing program – not a partnership but PPS is doing a service to the DoA.
The extent to which development research/activities are considered in planning projects			X	Limited staff maybe a reason
The extent to which basic research are considered when planning projects			X	The AD has conducted basic research projects earlier with the funding from the NSF. Internal funding only encourages services
The degree to which adverse effects on environment are considered in planning projects		X		Programs follow *Yala/Maha* cultivation seasons and other environmental effects

Projects are the buildings blocks of programmes. For an institution to achieve its objectives, there is a necessity that projects to be well planned in terms of their expected outputs, activities, and input requirements. Based on the information gathered (Annexure 4.7), the DoA in general spends huge amount of funds for pilot testing programs of chemicals. However, there is no mechanism available for the companies who make enormous profits based on the recommendations made by the DOA, to pay for the services rendered by the DOA including the PPS. This issue is currently being discussed at the Agro-pesticide Sub-Committee meeting as well (Annexure 4.5).

4.4 Program (Project) management and Maintenance of Quality

Since PPS is a service-based organization and categorized as such, proper program management and quality assurance/improvement practices are needed to ensure their effective operations. The quality of output and achievement of desired objectives must be

pre-programmed. Therefore, in this section, PPS programs are considered instead of the projects mentioned in the NASTEC handbook. The level of practice in program management is shown in Table 4.5.

Table 4.5. Level of practice of project management and maintenance of quality by PPS in the adopted projects

Management Practice	Level of Practice (Performance Indicators)			Comments/ Evidence
	Strong	Moderate	Weak	
The effectiveness of the procedures for resource allocation at different levels (organization, departments, program etc.)		X		No clear procedures and mainly the officer/s assigned for particular program are responsible. The programs are discussed at the beginning with relevant officers and included in the annual plan. Expected budget is included in the annual budget.
Ensuring that instruments, equipment and infrastructure facilities are sufficient for implementation of projects			X	Some programs are discontinued limited staff. For example the fumigation rerated a facility has been discontinued.
The effectiveness of administrative procedures and support for project implementation (procurement and distribution of equipment and materials, transport arrangements, etc.)			X	Transport arrangements – through available vehicles. The private sector provides transport to the pilot trail fields.
Formal monitoring and review processes are used to direct projects towards achievement of objectives			X	No review formal review process of programs except annually submitted reports to the DG through SCPPC. Individual officers report the progress to the AD, PPS
The extent to which the researchers are supported by the required technical / field staff.		X		Field programs are conducted with support from AIs and other field staff.
Ensuring that established field / lab methods, and appropriate protocols are used		X		Protocols are developed and followed. Some hand-outs and publicity materials are available.
Research projects/ S& T activities are completed within the planned time frame.		X		Based on the annual reports and progress of action plans, some programs are completed as planned while the others are delayed (based on annual targets and achievements)
Ensuring that scientists / researchers have access to adequate scientific information (scientific journals, internet, international databases, advanced research institutes, universities etc.) that strengthens the quality of research.			X	No evidence and the staff indicated that limitation in the discussions. It is problem in general in Sri Lanka and not limited to PPS
The extent to which quality assurance practices are followed by the institutions			X	No evidence available except the regular reporting followed by the DoA
Ensuring that researchers/ scientists have access to computers and necessary software			X	Not having a suitable pest surveillance database/ system was a concern during the discussions.

4.5 Human Resource Management

Availability of an adequate number of qualified staff and effective management of human resources are key determinants of organizational performance. The DOA operates under minimum number of scientific/research staff for many years and the numbers decrease annually owing to issues related to recruitment and retirement. The PPS is no an exception, total number of staff has reduced during the period of review from 2016-2018 (see Section 2). One retired officer hired on contract basis is handing the pilot testing program and involved with other regular work. Another retired officer hired to PPS has left PPS and joined HORDI (officially transferred). Tables 2.1 and 2.2 under Section 2 of the review report provides summary details of the cadre provision to PPS where the approved cadre is 48 and the existing number is 26 (Annexure 4.8).Table 4.6 shows the level of practice on measures adopted for human resource management by the PPS.

Table 4.6. Level of practice of measures adopted for human resource management by PPS

Management Practice	Level of Practice (Performance Indicators)			Comments/ Evidence
	Strong	Moderate	Weak	
The institution maintains and updates staff information in a database (including bio data, disciplines, experience, publications, projects)		X		Personal files are maintained at the AD office
The institution, plans and updates its staff recruitments based on programme and project needs		X		No evidence for new carder requests. However, the staff issue is raised everywhere.
The effectiveness of the selection procedures and the schemes of recruitment			X	No control of PPS. Recruitments are done centrally
Training is based on institution and program objectives and on merit,		X		Trainings are offered to different officers including foreign training as mentioned in the SER (page 12-13)
The effectiveness of the procedures in promoting a good working environment and maintaining high staff morale.			X	Staff is not satisfied with working environment in general
The effectiveness of staff performance appraisals		X		No proper schemes except regular salary increments.
The effectiveness of rewards and incentive schemes in motivating the staff			X	Not in the government system – Not an issue of PPS.
The effectiveness of managing staff turnover, absenteeism and work interruptions.			X	No direct control of PPS. As mentioned above, it is a problem in the DoA.

To keep pace with new developments in science, technology, and management of an

entity, it is also essential to upgrade the staff regularly. No proper staff planning, selection, recruitment, evaluation, and training have been planned and adopted by the PPS. However, this is mainly due to the organizational structure at the DoA and the PPS may not be in a position to directly address this issue. Nevertheless, these key components of human resources management need to be in place for effective performance of an institution. According to the information gathered (Annual Report 2018), one regional station of the PPS (Bombuwala) has been closed due to lack of staff. The number of total staff members in Mahalillupallama PPS regional center has also decreased over the years.

4.6 Management of Organizational Assets

According to the guidelines, the considered assets include staff buildings, equipment, and finances, but also include assets such as knowledge, technologies developed, intellectual property, and even credibility and reputation. Physical assets belonging to PPS are listed in the SAR and inventories are maintained as in any other government organization. Table 4.7 shows the level of management of organizational assets by the PPS.

Table 4.7. Level of management of organizational assets by PPS

Management Practice	Level of Practice (Performance Indicators)			Comments/ Evidence
	Strong	Moderate	Weak	
The ability of the institution to carry out its mandate and the assigned statutory powers			X	PPS is the implementation body of PP act of Sri Lanka. However, it has been weaken over the years. One regional centre is closed while the other one is not properly functioning. Points are detailed and highlighted in other sections.
Infrastructure (buildings, stations, fields, roads) is satisfactorily maintained.	X			Office spaces are renovated recently and maintained well.
Vehicles and equipment (lab, field, office) are properly managed and maintained.		X		Inventories and running charts are maintained
The effectiveness of procedures to ensure that equipment are in working order		X		No reports on regular testing
The effectiveness of the institution's overall strategy in generation and proper utilization of funds		X		Financial progress is reported to the DG – given in the SER. Some unutilized funds returned.
The extent to which the institution identifies opportunities for income generation and cost recovery			X	No income generation – Pilot testing is also done for free for the private sector.
The extent to which the intellectual property rights of the institute are protected	X			Filling a local patent for a control protocol is reported in the annual report 2018. Institutional name is included in the flyers and other documents published.

Some of the points highlighted in Table 4.7 are not specific to PPS but are generally issues pertaining to the DoA and other government organizations in Sri Lanka.

Continuous effort is needed to protect all of the organizational assets, as they are the basis for the sustainability of the institution and continue improving the quality of delivery of the outputs. However, most of the intellectual assets are not properly maintained by the PPS and the responsibilities have been transferred to other divisions of the DoA. One of the regional centers is closed (Bombuwela) while the other one (Mahailuppallama) is non-functional due to limited staff at the time of this review of the PPS. The Fumigation Unit of the PPS has been transferred to the Seed and Planting Materials Development Centre of the DoA although expertise and experience in handling dangerous fumigants lie in the PPS.

4.7 Coordinating and Integrating the Internal Functions/Units/Activities

The planning and coordination of units (departments, divisions, committees, research stations, etc.) and interaction among them affect the overall performance of the institution. The PPS is identified in the organizational structure of the DOA (Fig.XX). The performance of different divisions and units and the overall structure is assessed during the meetings of the Directorate organized by the DGA from time to time to ensure smooth and efficient operations. The planning and coordination of units, logistics, resources, and information flows are done at the directorate level and below depending on decisions. Table 4.8 indicates the level of practice of coordinating and integrating the internal functions of PPS.

Table 4.8. Level of practices in relation to coordinating and integrating internal activities by PPS

Management Practice	Level of Practice (Performance indicators)			Comments/ Evidence
	Strong	Moderate	Weak	
The extent to which institution is evaluated internally and restructured based on current needs			X	Services and activities of PPS are reallocated to different units and divisions in an add hoc manner without proper planning.
The effectiveness of internal communication and coordination mechanisms			X	Based on the meetings had with different officers of the DoA, it is clear that the internal commination and coordination is poor
Institution's overall direction and coordination are provided by a central planning committee / unit.		X		DG and the Directorate are at the central planning. The AD PPS follows the guidelines and procedures developed
The extent to which different units are assigned clearly defined functions		X		No clearly defined instructions in many cases. For example, while the pilot testing trails of weedicides are conducted by the PPS and no clear mechanism or unit involved in testing insecticides and fungicides
Responsibilities of research / management staff are clearly identified	X			Hierarchy is maintained

Effectiveness of using appropriate reporting procedures and feedback in management at different levels		X		Reporting procedures follow proper organisational channels.

4.8 Partnership in managing information dissemination

When considering the mandate and activities of PPS, the dissemination of technology and information to users is specifically important. The partnership and linking up with universities, industries, private sector, international research organizations, extension, farmers, etc., promotes information exchange. The technology dissemination has reported in the Annual Report and progress reports (Annexures 4.2, 4.3 and4.4). institutional and other publications are summarized in the SAR (page 17). The TV and radio programs and participation of exhibition are not indicated in the SAR but considered in the evaluation. Table 4.9 refers to the level of practice of such information dissemination by the PPS.

Table 4.9. Level of practice of information dissemination by PPS

Management Practice	Level of Practice (Performance Indicators)			Comments/ Evidence
	Strong	Moderate	Weak	
The institution systematically plans and performs dissemination of information		X		Flyers and information materials are prepared and updated in considerable frequency (Annexure 4.9). Has taken decisions and immediate actions for knowledge dissemination in pest outbreaks. Ex. Fall armyworm
The extent to which the institution plans and maintains linkages with key partners for sharing and dissemination of information		X		The technology dissemination has considered in annual plan and the progress is reported. However, no clear evidence on efforts taken for sharing and dissemination of information
The effectiveness of institutional procedures for technology transfer		X		Even though different methods are used, no formal collaborations between institutions – except in the case of Coconut Research Institution (CRI) for control of Yellow Spotted Grasshopper
The effectiveness of the system to obtain feedback from different types of stakeholders		X		There is no clear feedback reporting mechanism. Farmers may communicate during the meetings.

The PPS has actively involved in pest outbreaks and has disseminated necessary knowledge among relevant stakeholders, e.g. the fall armyworm outbreak. Collaborative efforts with the CRI was evident in the recent outbreak of Yellow Spotted Grasshopper. Active involvement or collaborations with other institutions such as universities was evident in the molecular level identification of Fall Army Worm and Yellow Spotted Grasshopper attacks. No formal evidence of involvement of regional institutions was available during the three-year period of review 2016-2018.

4.9 Monitoring, evaluation and reporting procedures

Monitoring and evaluation has given a prominence in the review process. However, assessing ongoing S&T / research activities and evaluating the value, quality and results are not included in the SAR prepared by PPS. Information gathered from the annual reports, group discussions and meetings are considered below (Table 4.10).

Table 4.10. Level of practice of monitoring, evaluation and reporting at PPS

Management Practice	Level of Practice (Performance Indicators)			Comments/ Evidence
	Strong	Moderate	Weak	
The institution monitors and evaluates (M&E) its own activities periodically			X	No evidence expect meetings of relevant members with AD.
M&E is supported by an adequate management information system (MIS), which includes information on projects (e.g. costs, staff, progress, and Results).			X	No MIS. Only paper based reporting
The extent to which S& T results and other outputs are adequately reported internally (e.g. through reports, internal program reviews, seminars).		X		Yearly reporting – annual reports
External stakeholders contribute to the M & E process in the institution			X	No reports having stakeholder discussions or meetings
The extent to which the results of M&E are used for project/ research planning and decision-making.		X		Output of previous year is considered in planning next year

In general, the government system is weaker in performance evaluation and adopting systems of appreciation. Therefore, some aspects listed above are not specific to PPS. Clearly, the monitoring, evaluation, and reporting procedures need to be properly designed and periodically reviewed. No evidence for involvement of stakeholders in such operations with PPS at any stage. It is clear that the PPS is not an independent institution. Therefore, the ability of PPS to produce useful and relevant outputs depends on, among others, the internal policies, strategies, management practices and the way in which these are applied in the DoA. In this review we have only evaluated the PPS considering the critical aspects listed above. This will help to identify causes that enhance or hamper the performance of the PPS.

Chapter 5- Productivity of institution based on outputs during past three years 2016-2018

Type of outputs

The output of PPS is summarized and presented in the annex with targets and achievements separately for the three years. The targets and output were constrained mainly by the shortage of S & T personnel.

Output measurements

I Technologies Developed

This organization is basically a service oriented organization. However, one technology on control of diamond back moth using a larval parasite was developed in year 2018**.** This technology has to be evaluated under field conditions for economic viability and social acceptance before it is recommended to the framers.

Technology on management of insect pests of Brassicaceae crops using the larval parasitoid, *Cotesia plutellae* and neem derivatives was developed by the Additional Director of Plant Protection Service. The technology was evaluated under field conditions and estimated saving over synthetic insecticide use per hectare was LKR 103,555.00. Application had been made for patent rights for this technology.

II Technologies Transferred

III. Information dissemination/extension

Summary of the activities carried out by PPS is given in Annexure YY with targets and achievements.

a) Institutional and other publications

PPS has issued 10, 22 and 13 publications in 2016, 2017 and 2018, respectively (Table 5.1). Most are advisory materials/leaflets. Details are given in annex as 2016 Publications, 2017 Publications and 2018 Publications.

Table 5.1 Publications of PPS during 2016-2018

Type of publication	Number of Publications		
	2016	2017	2018
Technical Reports		1	5
Consultancy Reports			
Advisory Materials/ Leaflets	5	10	2
News Letters			
Scientific Presentations	4	10	6
Other Publications	1	1	
TOTAL	10	22	13

Source: PPS Performance Reports 2016 to 2018

b) Training of staff

Staff training is highly biased towards S & T staff, indicating future need to consider training of other staff (Table 5.2).

Table 5.2 Training of staff at PPS during 2016-2018

Type of training	**Number of Employees trained**					
	2016		**2017**		**2018**	
	S & T	**Other**	**S & T**	**Other**	**S & T**	**Other**
Postgrad Diploma			1			1
Short Term	2	1	3	3	3	
Study tour/conference					3	

In recognition of the contribution made towards development of agriculture, the head of PPS, Dr. Dayani Perera was awarded two prestigious awards in 2018 as given below.

1. National Award for Science and Technology Achievements (NASTA)- 2018 Merit award in the category of Harnessing S&T for Sustainable Development, 19.12.2018, National Science Foundation, Sri Lanka.

2. His Excellency the President's Award for Best Contributor in the Agriculture Sector – 2018 under "Research category", Ministry of Agriculture, given by CARP on 11 December 2018. In consideration of research on Mass rearing of parasites and parasitoids of pests of Brassicaceae Family Crops for Commercialization in Sri Lanka.

Chapter 6- Overview of the institution's performance and contribution to national development

The main activities carried out by the PPS can be categorized into research, development and information dissemination. This chapter focuses on the performance of the institutions based on the progress and impact of such activities implemented by the PPS. Many of the activities performed have been done through either within-department or inter-departmental collaboration with state and private sector agencies.

The performance of any organization that provides services depends in the engagement of the key stakeholders. All those involved in agriculture in many different fields are stakeholders of PPS. Nonetheless, for ease of comprehension they are categorised as follows:

(a) By default, all the scientific staff involved in agriculture and forest research, extension and seed production
(b) Policy makers involved in agriculture
(c) University staff involved in agriculture and related fields
(d) Officers in Government, Private and Non-Governmental Organizations (NGO) involved in environment protection
(e) Personnel involved in importation, storage, distribution and sales of agricultural and household pesticides
(f) Personnel involved in importation, storage, distribution and sales of seeds and planting materials
(g) Personnel involved in agricultural and household pest management
(h) Personnel involved in manufacture, storage, distribution and sales of botanical pesticides
(i) Farmers/Practitioners

The performance of the PPS described below is a collective effort between the PPS and the stakeholder groups identified above.

6.1 Contribution to National Development

The PPS has taken initiatives to develop and promote economically viable, effective environment-friendly and safe pest management in rice, vegetables, fruits and other field crops. Management of invasive alien plant species (including aquatic and terrestrial) and to increase the quality of land for food production and to increase the quality of the water for agriculture and other human activities has been one of the main focuses. The PPS has also been actively involved in surveillance and forecasting of new pests of quarantine

significance in Sri Lanka while embarking on implementation of pest management activities contributing to the sustainable management of agricultural pest problems in Sri Lanka contributing to enhancing farmer incomes, and thus, the national economy. Some specific activities in this context are described below.

6.1.1 Implementation of the Plant Protection Act No 35 of 1999

Section 1.6 refers to the role played by the PPS in relation to the PPA No. 35 of 1999.

6.1.2 Implementation and promotion of Integrated Pest Management (IPM) packages

The PPS has taken initiatives to implement and promote IPM packages for rice, vegetables, fruits and other field crops across farming communities in Sri Lanka. These activities were implemented in collaboration with the extension services and research of the central government and provincial councils. The activity is of national significance being environmentally-friendly, healthy and efficient integrated pest management practices. The related activities are conducted mainly via Famer Field demonstrations, training of officers and farmers, creating awareness among stakeholders, conducting Farmer Field Schools (FFS) and Farmer Field Days (FFD), promotional programmes conducted through public-private-partnership (PPP), preparation of booklets, leaflets, and posters, conducting TV/radio programs, etc. With such programmes the PPS anticipates reduction of pest and disease problems and increase crop productivity.

The IPM and Good Agricultural Practices (GAP) are integral activities for the sustenance of plant protection with minimal use of pesticides and reduce their impact on human health and the environment. This programme was conducted to improve the knowledge of extension officers and farmers on IPM and GAP concepts. Special attention was given to minimise the use of pesticides by promoting non chemical pest management strategies for efficient pest management at farm level.

Some of the field activities are presented below in photographs.

Field training program conducted by the PPS for IPM in rice

Field training program conducted by the PPS for IPM in vegetables

6.1.1. Permanent Crop Clinic Program (PCCP)

The Permanent Crop Clinic program (PCCP) concept was introduced to Sri Lanka in 2009 as a pilot project in selected districts. With promising results, the Department of Agriculture decided to expand the program throughout the island since March 2013. The main objective of the PCCP is to provide better advice on pest management to farmers when their crops are not healthy, especially focusing on Integrated Pest Management (IPM) techniques. The PCCP activities (Annex 6.1) are conducted by Plant Specialists (Agriculture Instructors) at permanent places, and the date and time of the clinic is informed to farmers through posters, SMS, and at farmer organization meetings. At the PCCP, the Plant Specialist makes a diagnosis after observing a sample brought by farmers and the farmer will receive a written prescription. A copy of the prescription is sent to the plant protection service of DOA and

data management staff upload its content onto the Plant Wise online data management system to develop a database from which researchers, extension officers and policy makers could draw information on the crop pest situation in Sri Lanka. The database also allows program managers to monitor activities and identify training needs while Plant Specialists could increase their knowledge and the quality of diagnosis and advices could be improved further. The PPS has been given the responsibility as the National Responsible Organization (NRO) to coordinate with national partners in managing crop clinics. The Deputy Director (Plant Protection) is functioning as the National Coordinator of PCCP.

The PPS has collaborated with the Center for Agriculture and Bioscience International (CABI) to establish Permanent Crop Clinic Programmes (PCCP) to ensure quick and effective diagnosis of pests and diseases. The programs are aimed at promoting sustainable agricultural practices that enhance productivity and improve the livelihood of small-holder farmers. In order to facilitate this process, officer training as Master Trainers, training on "Plant Doctor" (with two course Modules), Data management, Mass media programs, Progress evaluation and Refresher training programs have been carried out. Training of officers of the Department of Export Agriculture has been conducted by the PPS to support expansion of such activities into other government agencies.

Training conducted by the PPS on Permanent Crop Clinic Programme

6.1.2. Technical Assistance in Field Rodent Management

The PPS has initiated programs to provide technical assistance to control rodents in rice fields. Rodents remain one of the main nuisances to mankind, especially the rice farmers. For thousands of years they have been causing damage to crops, stored grain and infrastructure, and are reservoirs for devastating human diseases such as plague and typhus. Rodents continue to cause serious damage to staple food crops such as rice, despite advances in methods of control and management techniques, and this initiative of PPS is of national significance.

Stored pest management by PPS officers at the Department of Agriculture

6.1.3. Pest surveillance and forecasting of important plant pests

Initiatives have been taken by the PPS to establish a pest surveillance and forecasting programmes of important agricultural pests through establishment of pest databases, data collection in collaboration with necessary stakeholders, data management with the support of NAICC, issuing early warning of important pest problems and officer trainings. A scientific approach to establish early warning systems in terms of agricultural and other pests is extremely important in the present-day context especially considering the climate change scenario and recent experiences Sri Lanka had with pest outbreaks. The Department of Agriculture is currently closely monitoring the potential invasion of desert locust (*Schistocerca gregaria*) through periodic issue of alerts by the FAO of the United Nations.

Pest surveillance programs conducted by the PPS staff with the farmers

6.1.4. Identification, development and promotion of management protocol for Alien Invasive Species (IAS)

Identification, development and promotion of management protocols/packages for Alien Invasive Species is of national significance to implement programs for their Management by introducing protocols and packages. The PPS has developed plans to provide field demonstrations, training of necessary stakeholders, conduct of awareness creation programs and workshops, preparation of leaflets and posters, mass media campaigns using TV/Radio programs to support this activity keeping in line with the National Invasive Alien Species Policy, Strategy and Action Plan adopted by the Cabinet of Ministers and implemented by the Ministry of Environment and Wildlife Resources. Further, the PPS has conducted training programmes targeting field level officers of the Department of Irrigation and Mahaweli Authority of Sri Lanka on the IAS management especially focusing on aquatic invasives.

6.1.5. Development promotion of mass rearing protocol for bio-control of aquatic weeds

Rearing, augmentation and promotion of bio-control agents to control invasive aquatic weeds have become a priority in many countries. Biological control has been used successfully as a practical and economically affordable weed control method in many situations at global scale. Historically, the PPS has played an important role in having rearing facilities and release of biocontrol agents to control of Salvinia (*Salvinia molesta*) and water hyacinth (*Eichhornia crassipes*). Mass rearing of *Cyrtobagous salviniae* (to control Salvinia) and *Neochetina bruchi &N. eichhorniae* (to control Water Hyacinth), determination of the release rate, introduction to reservoirs etc. are the main activities carried out by the PPS in this regard. These bio-control agents were released to infested water bodies on request made by government, private or non-government organizations to manage/control these weeds. Training of necessary stakeholders, awareness creation among necessary stakeholders and mass media campaigns using TV/radio programs are some of the activities carried out by the PPS to promote biological control of aquatic weeds in Sri Lanka.

6.1.6. Pilot scale testing of herbicides

Conducting pilot scale tests for agro-pesticides prior to their registration is a mandatory requirement imposed by the Registrar of Pesticides (ROP) in Sri Lanka. This activity has also been one of the key activities performed by the PPS over the last few decades contributing to national development. However, currently the pilot scale testing conducted by the PPS is limited to herbicides/termiticides, which are also conducted in collaboration with the respective Pesticide-importing Companies.

The pilot scale tests for fungicides is not done at present. However, for the relevant testing for insecticides is done by the researchers of other divisions or institutes with the concurrence of the PPS. Reporting and presentation of progress of such trials has been done by the Registrar of Pesticides and the relevant Working Groups.

Assessment of the impact of herbicides by PPS officers during pilot-scale testing

6.1.7. Management of pest outbreaks to ensure plant protection

Pest populations are governed by their innate capacity to increase as influenced by various abiotic and biotic factors. The intensification of agriculture has resulted in increasing incidences and outbreaks of a number of insect pests in agro ecosystems and forest ecosystems. The PPS has been responding to such pest outbreaks in the country in the recent past. Emergency responses to control national level pest outbreaks such as Fall Army Worm (*Spodoptera frugiperda*), yellow spotted grasshopper (*Aularches miliaris*), and Brown Plant Hopper (BPH; *Nilaparvata lugens*), invasive plants such as Alligator weed (*Alternanthera philoxeroides*), giant mimosa plant (*Mimosa pigra*), salvinia and water hyacinth are some examples in this regard. The responses to pest outbreaks by PPS could be assessed based on the visits made to farmer fields, forecasting of pest outbreaks, training of necessary stakeholders and assistance provided to necessary stakeholders to manage outbreaks without delay.

6.1.8.Research on bio-pesticides

The PPS is currently conducting evaluations on the efficacy of using bio-pesticides to control spider mites in strawberry cultivation in green houses in the upcountry region as a measure of introducing environmentally friendly pest management techniques.

6.1.9.Technical assistance to overcome pest problems in nationally important sites

The PPS has been actively involved in the solving issues pertaining to venerated trees and

those at nationally important sites such as the *Jaya Sri Maha Bodhi* and other locations.

Technical support to identify pest problems & treatment of *Jaya Sri Maha Bodhi* at Anuradhapura and other venerated Bodhi trees at locations throughout the country

6.2 Networking including international collaborations

- The mandated activities of the PPS requires significant involvement of relevant stakeholders comprising state, provincial and local government level officers, private sector and the society as a whole. A continuous rapport with the stakeholders is thus a necessity for the PPS to perform its mandated actions and to have a feedback for further improvement of the service.

- The PPS currently operates with one regional center established in Mahailluppallama (see description elsewhere). Upon request and when the need arises, there has always been support provided by the Provincial, District Secretariats, and Local government staff for PPS related activities across the country. The involvement of all sectors in responding national calls to control invasion of Fall Army Worm (*Spodoptera frugiperda*) and outbreaks of yellow spotted grasshopper (*Aularches miliaris*).

- Over the years, the PPS has worked closely with the international development partners of Sri Lanka such as FAO, and internationally renowned institutes related to Pest Management such as Australian Center for International Agriculture Research (ACIAR) Center for Agriculture and Bioscience International (CABI), in accessing technologies to solve pest problems in Sri Lanka. Such programmes implemented in Sri Lanka in collaboration with international partner agencies are listed in Table 6.1.

Table 6.1. Programmes carried out by the PPS in collaboration with international agencies during the review period

International Agency	Project Implemented	Year of implementation
Center for Agricultural Bio Science International (CABI) in United Kingdom	Permanent Crop clinic Programme	2016-2017
World Vision Australia	Traditional agricultural practices for garden IPM - 2016/2017	2016-2017

- The stakeholder consultation carried out by the reviewers revealed that there are significant gaps existing between the PPS and the stakeholder engagement in the related activities. Prioritization of activities of the PPS requires a considerable input from the various stakeholder groups that seek assistance from the PPS. Following are the key outcomes of the stakeholder consultation carried out by the review panel, especially focusing on areas to be further improved.

(1) The PPS does not have a stakeholder engagement strategy and mechanism, resulting in failure to identify a coherent group of stakeholders, their networking and weak reporting mechanism.

(2) Regional branches/units of the PPS is a need to respond to emerging problems. The PPS requires to adopt strong networks with the Provincial Councils, District Secretariats, local governments and the private sector to perform ground level activities with utmost efficiency.

(3) There is a shortage of expert staff at PPS to tackle different but important aspects of pest control needs of the society resulting in delays in response to national and local levels issues especially in terms of pest surveillance, reporting and rapid response. The PPS is losing their grip in conducting pilot scale testing of agro-pesticides mainly owing to lack of trained staff, including skilled labour force.

(4) The efforts made for continuing professional development of the PPS to improve their level of competence in pest management is at an unsatisfactory level to use modern technological tools in overall pest management.

(5) Despite the efforts made to response to pest outbreaks, the PPS has not adopted a comprehensive pest forecasting system in collaboration with the international agencies. Adopting such forecasting system and making information available in public domain is imperative to support the pest control systems in Sri Lanka.

(6) The PPS has not established a plan to support continuing professional development of its staff. This is an unfortunate situation that has led to demoralization and lack of interest among the limited staff available resulting in below par performance.

(7) Sharing of the knowledge base with the other institutions and stakeholders is weak and thus requires further attention by the PPS to educate stakeholders including the general public on the activities conducted.

6.3 Internal monitoring and evaluation systems

The PPS plans projects and programmes/activities following a consultation process with all the technical staff members and other relevant officers. The respective project proposals are prepared project proposals are prepared at the beginning of the year. The overall project monitoring and progress reviewing are done by the Department and the Ministry of Agriculture. However, internal monitoring and evaluation of the projects/programmes implemented by the PPS have not been formalised. This is a serious deficiency in the management of the PPS that requires urgent attention for successful completion of the mandated programs and project-based activities conducted by the entity. The general reporting and evaluation system has been assessed under the section 4(ix) of this review report.

6.4 Staff recruitment and training

Failure to have continued staff recruitment following a retirement plan has been a major issue faced by the Department of Agriculture and PPS is not an exception. For several years, the PPS was plagued with lack of trained human resources to carry out its mandated activities. The problem still continues. The current staff strength is presented in Table 6.2.

Table 6.2. Staff strength of PPS during the period 2016-2018

Staff Category	2016			2017			2018		
	Cadre	Filled	Vacant	Cadre	Filled	Vacant	Cadre	Filled	Vacant
Science & Technology	26	4	22	26	4	22	26	4	22
Administrative	4	4	0	4	3	1	4	4	0
Technical	13	11	2	13	11	2	13	8	5
Total Staff	43	19	24	43	18	25	43	16	27

The most experienced member in the S&T category, excluding the Additional Director of PPS, as at present is a contractual appointment after retirement as an Agriculture Instructor. Currently, only the Additional Director holds a PhD level training among the S&T staff with one member having an M.Sc. degree while the other with a basic degree qualification. The large number of vacancies existing in the PPS under the S&T category explains the highly unsatisfactory status in the PPS in terms of trained human

resources to perform its functions of national significance.

Further, the staff at PPS has not gone through well-planned training as part of the continuing professional development (CPD). Table 6.3 indicates the level of exposure of the PPS staff to different activities related to their capacity building.

Table 6.3. The exposure of staff at PPS in capacity building programmes.

Number trained	2016		2017		2018	
PG degree level	0	0	1	0	1	0
PG diploma level	0	0	0	0	0	0
Short-term training	2	1	3	3	3	0
Study tours/Conferences	0	0	0	0	1	0

6.5 Implementation of Plant Protection Act and regulations

Implementation of the Plant Protection Act No 35 of 1999 including regulations pertaining to the act is supposed to be the major function of the PPS, which should be carried out jointly with the National Plant Quarantine Service (NPQS). The latter looks after the interests of the Plant Quarantine Aspects in the Act. The implementation of the act is done by the appointment of authorized officers (see Annexure 6.1a to 6.1c) by the Director General of the Department of Agriculture to encompass the whole country. The number of authorized officers appointed has increased during the period 2016 to 2018 highlighting the importance of the said activity to effectively implement the Plant Protection Act No 35 of 1999. Based on the international agreement signed by Sri Lanka, (e.g. International Plant Protection Convention), only the PPS is responsible for issuing the phytosanitory certificate for all plant commodities exported. However, at present, the NPQS carries out the responsibility. The plant protection regulations are established by the Minister of Agriculture under section 12 that reads with section 13 of the Plant Protection Act No. 35 of 1999.

Training program held to appoint Authorize Officers to implement the Plant Protection Act No 35 of 1999

6.6 Plant protection research and development

Despite the importance of plant protection research and development in Sri Lanka, the PPS as an entity has limited or no involvement in formal research programs in the current context. The individual scientists, including the Additional Director has been involved in research activities in the field of plant protection and has also been recognized for her scientific achievements in the recent past, i.e. National Award for Science &Technology Achievements (NASTA) in 2018 from National Science Foundation (NSF) of Sri Lanka, Ministry of Agriculture, National Award 2018 by the SLCARP, and the Best Scientist Award at the Annual Symposium of the Department of Agriculture in 2019.The PPS should have been involved heavily in plant protection research and the absence of correct directions in this regard have affected the agriculture sector and the industry as a whole.

The PPS, however, has come up with limited number of technical and scientific reports as identified in Table 6.4. The efforts made by the PPS to produce periodic newsletters starting from 2018 to ensure rapid information dissemination is commendable. However, it is noteworthy to mention that PPS has not safeguarded its own publications. For example, leaflets prepared by PPS in 1970s on yellow spotted grasshoppers were not available which led to fresh and hurried drafting of another leaflet regarding the pest in 2020 when the insect suddenly reappeared in the country.

Table 6.4. Number of publications of the PPS during the period of Review (2016-2018)

Type of Publication	2016	2017	2018
Technical reports	0	1	5
Advisory Materials/leaflets	5	10	2
Newsletters	0	0	3
Training manuals/databases	2	1	0

The PPS has been successful in achieving the following in its development efforts to support the mandated roles.

(i) New laboratories/building and accreditations to the Plant Quarantine laboratory which was attached to the Plant Protection Service at Gannoruwa
(ii) Procurement of new equipment: Incubator for biological control agents**,** GALLENKAMP Hot Box Oven with Fan
(iii) Initiation of upgrading the building with three-phase electricity
(iv) Maintenance of building structures: relevant repairs to the existing building, laboratory, vehicles, machineries, etc.
(v) Establishment of safety measures with integrated safeguards and security of staff and equipment

6.7 Extension and training

The PPS has been actively involved in a significant number of the training and extension activities during the period of review (2016-2018). The details of such activities are presented in Annexure 6.1a to 6.1c. The number of training programs held based on those planned in respective years is satisfactory. However, a post-evaluation of the training programs has not been done systematically (no reports were made available), which is drawback to assess the effectives of the programs as well as strengthening of the said programs offered in the future.

6.8 Climate smartness

There is no clear indication of the incorporation of climate change concerns to the annual programs offered by the PPS. The PPS should follow the National Adaptation Plan (2016-2025) and National Determined Contributions (NDCs) submitted by the Government of Sri Lanka (Ministry of Environment and Wildlife Resources) to the United Nations Framework Convention on Climate Change (UNFCCC) and give due consideration to climate change scenarios in development of its training programs, pest surveillance and pest forecasting activities.

6.9 Revenue earned and capacity for enhancement

Since the organization is primarily a service, there is no revenue earned during the review period. However, it has the capacity to earn revenue. The pilot testing programme could be a source for revenue to be collected from the private organizations which have interest in marketing the products.

6.9.1 Publicity

The PPS maintained a website under the main web page of the Department of Agriculture. The site provides some updates of the activities related to the PPS but, is deficient in many information. Hence, it is strongly suggested to upgrade the website of the PPS to provide adequate information regarding the activities of the PPS and nationally important information related to the plant protection activities.

Participating at exhibitions is one of the key activities that has given a wider publicity to the services rendered by the PPS. This activity is further encouraged with adequate dissemination of information both in printed and electronic media to educate the arming community regarding plant protection activities carried out by the PPS and remedies to issues related to plant protection in agriculture. In 2018, the PPS has taken part at exhibitions held at Kuliyapitiya (Education and Vocational Guidance Exhibition in October), Moneragala (Enterprise Sri Lanka Exhibition in November), and BMICH in Colombo (HARVEST 2018 exhibition, Colombo)

Participation at Enterprise Sri Lanka Exhibition in Moneragala in November 2018

The PPS has developed several leaflets on plant protections targeting dominant pests and disease conditions, including that of invasive alien species, mainly in Sinhala and Tamil medium. It is suggested to upgrade the leaflets using latest scientific information and post such publications in the PPS webpage for a wider access of stakeholders.

The PPS provides newsletters, and it is suggested to have the newsletters and news updates online or any other public domain for easy access of the general public. The PPS should initiate a social media account to carry out its extension and awareness building programs.

Chapter 7- Overall judgment on the different aspects and proposals for improvement

The review team recognizes the wealth of information assimilated pertaining to the enormous responsibilities of the PPS in plant protection activities in Sri Lanka. The PPS caters to a wider spectrum of clientele in the country satisfying their technical needs while fulfilling the international requirements of phytosanitary certification with respect to imported and exported agricultural commodities. Nevertheless, the poor state of functionality of PPS at present owing to many reasons took the reviewers by surprise as the PPS should have functioned as the focal point of plant protection in the country. Historical developments indicate the decline and decimation of PPS, from the glory days in the past. The decline has occurred in stages before and after the restructuring of the DoA in mid 1990s. The important and key responsibilities of a plant protection organization are import control of plant products entering the country to prevent pest entry and internal pest control measures to eradicate/manage existing pests and those that have entered or have the potential of entering the country and could become economically important pests. These activities must be coordinated by a single entity for successful implementation. Sri Lanka as a contracting party to the International Plant Protection Convention, IPPC in 1951 is obliged to prevent the introduction and spread of plant pests. A central obligation under this cooperative agreement is to establish and maintain a national plant protection organization (NPPO).

Above obligation was included in the "New Revised Text" (1997) of the IPPC and sets out clear functions for the NPPO. In many cases, fulfilling these functions and obligations requires contracting parties to establish institutions, systems and operations that go beyond the scope of the older and more restrictive concept of plant quarantine. In practice, this means that the NPPO shall be the competent and legally responsible entity for implementing the functions outlined in the IPPC. These encompass the actions needed to prevent the introduction and spread of plant pests. The establishment of a functional NPPO is a national obligation for all contracting parties to the IPPC (ref. Operation of a National Plant Protection Organization FAO, 2015).

Given the present depletion of scientific staff, it is recommended that the PPS implement a programme for staff strengthening. Please see proposal below.

7.1 Short-term strategy to address the immediate constraints faced by PPS

At present PPS of DOA has major human and capital resource constraints to address the plant protection activities in the island and there is no visible clue to address these issues. As a short-term solution the, following is proposed with marginal capital investment.
DOA has senior SLAgS officers in every district attached to the District Secretariat. These officers could function as plant protection liaison officers (PPLO) under the PPS.

Since the district officers are not specialists in plant protection, it is recommended to provide a comprehensive and intensive training on PPS activities with pre and post evaluations. The training curriculum should address the Plant Protection Act, Invasive Pests and their threats, Pesticide Recommendations and current issues connected to pesticide overuse, etc.

An officer to be nominated or designated as PPLO should score minimum, eighty percent at the post evaluation. Only such officers should be appointed as PPLO and paid an attractive monthly allowance by the DoA budget. The assigned responsibilities should be the following:

1. Coordinate with all agricultural institutes in the jurisdiction area on behalf of PPS of DOA.
2. Represent PPS of DOA at District Agriculture Committee etc.
3. Forecasting pest outbreaks of district.
4. Development of a plant protection action plan for the jurisdiction area in consultation with PPS and other agricultural organizations.
5. Actively support PPS in pest eradications.

Seasonal action plans should be clearly prepared to identify the inputs, outputs, outcomes and impact of the proposed plan. Based on the plan, quarterly review meetings should be held to review the progress. The review meeting should be chaired by Head of PPS.

7.2 Need for restructuring of the PPS

The PPS has the national responsibility to implement technologies to protect flora in the country including food crops and non-food crops growing in the environment. Plant protection begins with prevention of introduction of alien pests and is followed by an active internal plant protection mechanism focused on eradication of harmful pests wherever they are found. Therefore, both plant quarantine or entry point regulation and internal plant protection mechanisms require integrated actions to minimize threats. The workload and thrust on responsibilities on the internal plant protection activities are country-wide and cuts across multiples of stakeholders and many actively controlled pests and ad hoc threats from new pest outbreaks described in Section 6 compared to the somewhat less tedious tasks assigned to the plant quarantine units at the seaports and airports.

The existing administrative outlay should be restructured to harmonize the entry point quarantine and internal plant protection mechanism into a holistic structure in line with internationally acceptable norms. The following structure is proposed where the PPS is upgraded as the National Plant Protection Centre (NPPC). This would also be satisfying the IPPC's requirement for an NPPO and would be the national focal point for all plant protection activities.

7.2.1 National Plant Protection Center (NPPC)

The Review Team has concluded that the restructuring of the PPS must be immediately performed and the unit must be upgraded mindfully to address the full original mandate; i.e. to be responsible to the Director General of Agriculture (DGA) for comprehensive implementation of the Plant Protection Act No. 35 of 1999 on his/her behalf. It is therefore recommended to install a fully-fledged Director for **National Plant Protection Centre** (NPPC) who would be responsible for all quarantine and internal plant protection matters. On a time scale, such a restructuring would be possible within six months if the higher authorities, Ministry responsible for the subject of Agriculture and Public Service Commission, etc. could approve the proposed restructuring in the immediate public/country interest. A pre-requisite for the restructuring is the provision of the full cadre of the existing PPS. In making this recommendation, the review team assumes that the stalled staff recruitments to the Sri Lanka Agriculture Service due to a court case could be settled in the near future. A positive development during the review augers well that the DOA should capitalize to strengthen its fairly stagnant organizational deficiencies in the shortest possible time.

The advantages of the proposed restructuring to the DOA would be as follows.

(a) Installation of a single Director (NPPC) who would be easily be accessible in Peradeniya and be responsible to the DGA to implement one of the fore most important Acts under his/her command, i.e. PPA No. 35 of 1999.

(b) The Director (NPPC) will thus be responsible to the DGA for enactment of all responsibilities under the PP Act such as issuing import permits for agricultural products, export phytosanitary certification, installation and full control of regional PP offices in the country, control of entry point quarantine and internal plant quarantine, adherence to the stipulated procedures and guidelines for detection of pests, their testing, follow up actions, gazzeting of pests for active control, plant protection research, training of officers and farmers, provision of extension services and coordination with crop research institutes (TRI, RRI, SRI, CRI, HORDI, FCRDI, RRDI, etc.), the provincial extension services, plantation sector, natural resource conservation, business community, and provide leadership in coordination of pilot testing of all pesticides and their screening programmes.

The reviewers noted that at present these vital subjects are in disarray. There is no single entity in the DOA that is responsible for assigning tasks at hand or for supervision or coordination of all the important activities listed above. However, there is quick response by the PPS whenever pest outbreaks are reported and control measures are executed successfully in consultation with entomologists, pathologists and other experts including those in the universities which must be commended. However, routine cohesive planning of all plant protection activities and their coordination have to be addressed in consultation with crop research organizations in the country and service providers including those in the extension services.

(c) Regional Centers for Plant Protection to be set up at the Provincial Councils, in direct liaison with the NPPC to support the plant protection activities, an effective dissemination of information, and to strengthen the response measures linking with stakeholders' expectations. These regional centers with skilled manpower will help overcoming current deficiencies of the PPS that have been discussed during the review workshop and they look forward to strong technical backstopping for the industry and the farming community.

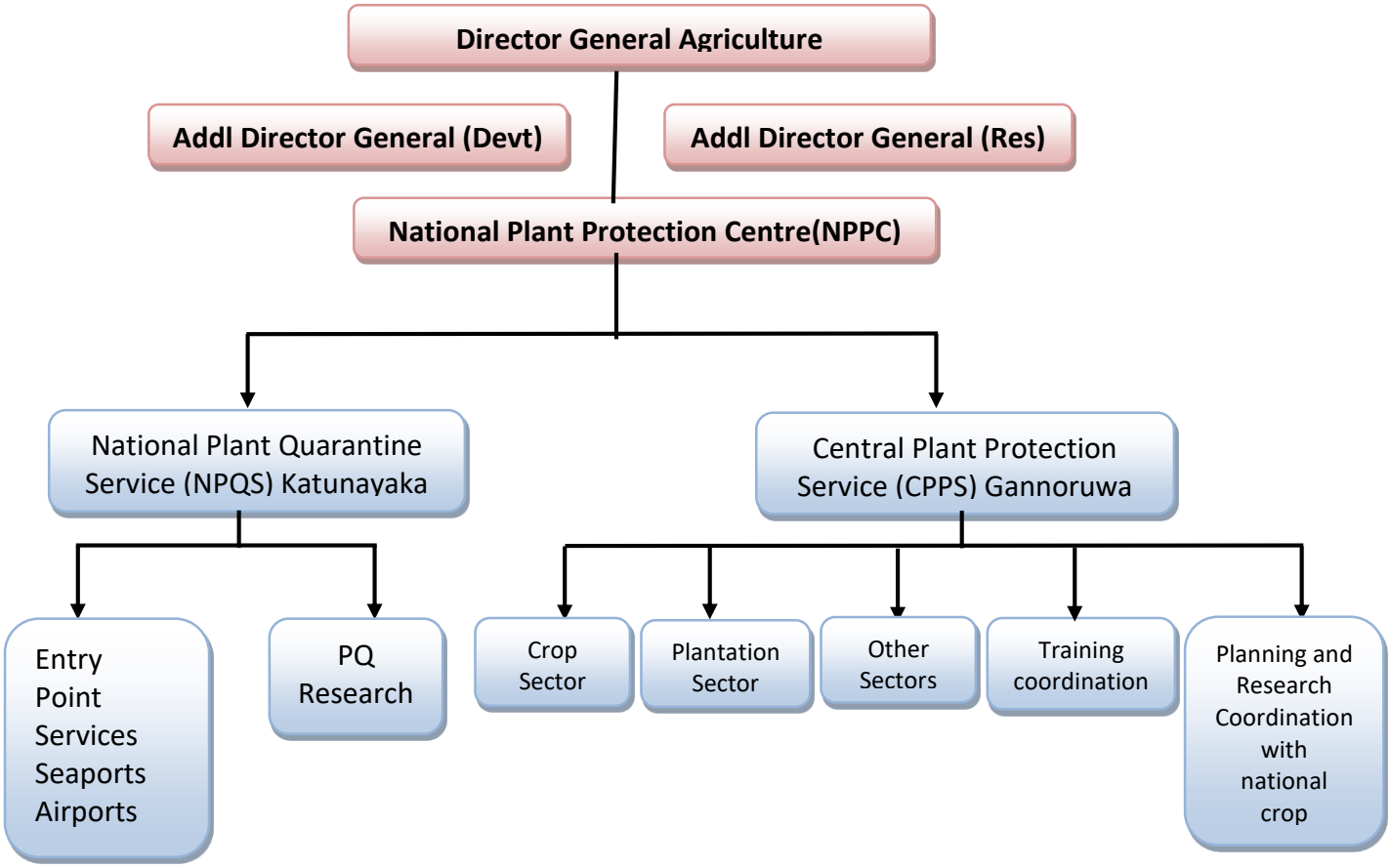
(d) Make the NPPC (and current PPS) responsible for evaluating pesticides at pilot scale with the support of other staff from different divisions of the DOA and other entities including Universities to expedite pesticide recommendation process. The NPPC (and existing PPS) should be made an independent evaluation entity to confirm results generated at the Research Stations for pesticide efficacy to be presented to the Agro-Chemical Sub Committee to make the final recommendation.

7.2.2 Proposed structure

At present, the head of NPQS is performing entry point quarantine functions and issue of import permits and quarantine research on behalf of the DGA. There is no or weak coordination in respect of post-entry quarantine or conformity with the sampling and testing requirements for imported seeds and planting materials stipulated under the Seed Act No. 22 of 2003 administered by the Director of SCPPC. The situation has given rise to duplicity and inability to fix responsibilities to a single hierarchical administration for national plant protection. Further, the status quo is internationally unacceptable for want of a national focal point for an important subject which has many dealings with foreign countries. Further, local stakeholders complain of lack of a single organization to deal with for required services.

Figure 7.1 would provide the crucial organizational platform for a National Plant Protection Centre (NPPC) necessary for implementation of the basic plant protection functions. It would serve the aspirations of the crop sector organizations, plantation sector and others such as the forestry sector in the country and streamline the administration of the plant quarantine system at all entry points under the control of a single director responsible to the DGA and satisfy to an extent, the international obligations.

Figure 7.1 Proposed organogram for the NPPC



The NPPC should be headed by a Director who will be a member of the Directorate of the DOA and stationed at the present PPS office in Gannoruwa, which has to be renamed as the Central Plant Protection Service (CPPS) operational under the NPPC.

Conclusion

Concerns for the environment have priority the world over now, as never before. However, pristine Sri Lanka was well documented in the past by many a visitor and appreciated as a model country for environment conservation because of the sustained commitment of its leaders and natives.

First phase of the Green Revolution and Globalization have brought adverse impacts on the country's biological, physical and chemical environments. While it is important to adopt appropriate technologies to enhance crop yields, the correct decisions and selections have to be made by the policy makers, administrators and implementers of protective legislations with commitments focused on sustainable environment management as the essential driver of development. Our environment is enviously green, a special hue because of the plants and lush vegetation, some planted, but most created by nature, and all need protection. The Science of Plant Protection offers substantial means for safe environment management. Every cumulative attempt to resurrect and empower the decimated PP organization of the DoA to implement the Science would be environmentally sacrosanct.

Annexures 01

Response to questionnaire on Pesticide Usage per Crop Group - (Export Agricultural Crops)

Score: >3.5, Moderate 3.49 - 2.5, Light 2.49 -1.5, None <1.5 Sample size = 13

1.1. Perennial spices Group I - Cardamom, Cinnamon, Cloves, Nutmeg, Pepper

	Heavy	Moderate	Light	None
Weedicide			1.62 (40.27)	
Insecticide			2.23 (26.86)	
Nematicide				1.38 (36.57)
Rodenticide				1 (0)
Acaricide				1.23 (35.63)
Fungicide			2.31 (20.81)	

Numbers in parenthesis are coefficient of variation

1.2. Annual spices - Ginger and Turmeric

	Heavy	Moderate	Light	None
Weedicide				1.31 (48.21)
Insecticide				2.15(37.17)
Nematicide				1 (0)
Rodenticide				1.08 (25.75)
Acaricide				1 (0)
Fungicide			2.54(26.05)	

1.3. Arecanut

	Heavy	Moderate	Light	None
Weedicide				1 (0)
Insecticide				1.08 (25.75)
Nematicide				1 (0)
Rodenticide				1(0)
Acaricide				1(0)
Fungicide				1.15(32.55)

Numbers in parenthesis are coefficient of variation

1.4. Betel

	Heavy	Moderate	Light	None
Weedicide				1.08 (25.75)
Insecticide			1.62 (31.35)	
Nematicide				1.08 (25.75)
Rodenticide				1(0)
Acaricide				1.08 (25.75)
Fungicide			2.31 (32.55)	

Numbers in parenthesis are coefficient of variation

Score: >3.5, Moderate 3.49 - 2.5, Light 2.49 -1.5, None <1.5

1. Floriculture [Sample size (n) = 7]

	Heavy	Moderate	Light	None
Weedicide			1.57 (35.04)	
Insecticide		3.29 (14.85)		
Nematicide				1.29 (58.79)
Rodenticide			2.14 (32.20)	
Acaricide			1.86 (57.56)	
Fungicide		3.00 (33.33)		

Numbers in parenthesis are coefficient of variation

ANNEX 2016 Publications

PUBLICATIONS AND PRESENTATIONS – 2016

- **Presentations**

1. Weligamage S.S. (2016). Fruit fly Management in Sri Lanka. International training workshop on fruit fly management,19-26 June 2016, Hochiming City, Vietnam.

2. H.Nimalananda (2016). Integrated Pest Management for rice in Sri Lanka. International training workshop for agriculture, 01/04/2016-15/07/2016,Chiro, Egypt.

3. I.Pussegoda (2016). Grain and oil crops and irrigation system comprehensive utilization technology for Sri Lanka. International training programme on Grain and oil crops and irrigation system comprehensive utilization technology for developing countries, 09/07/2016-06/09/2016, Changsha, China.

Poster Presentations

1. Jayasundara M.U.P, Abeykoon A.N, Y.M.C.K.Herath (2016) Permanent Crop Clinic in Sri Lanka making use of data resolve crop health problems. A poster presented during the Annual symposium of Department of Agriculture held in 08 and 09 September 2016, Plant Genetic Resource Centre, Department of Agriculture, Peradeniya.

- **Books/Booklets**

1. Weligamage, S.S, Ihalagamage, T. N, Piyatissa, P.M.U.B, Hapukotuwa, N. K,Hemachandra, S.S.K,Wijesinghe, C,Nimalananda,H, M.S.K.K. Perera (2016) 51 pgs. Survey on Invasive Alien Plant Species and their impact in selected locations in Central, North Central and Northern Provinces in Sri Lanka.(Survey on Invasive Alien plant species under the Project Strengthening capacity to control introduction and spread of invasive alien species in Sri Lanka submitted to Ministry of Mahaweli Development and Environment)

- **Leaflets/Technical notes**

  S.Sweligamage (2016) Management of establishment of invasive alien species in Sri Lanka 2016 February Agtech in brief

  S.SWeligamage (2016) Management of Giant Mimosa 2016 April Agtechin brief

  S.S Weligamage (2016) Integrated Pest Management for Mung bean cultivation

  S.S Weligamage (2016Prevention of viral diseases for Mung bean cultivation

  JayasundaraM.U.P, T.N. Ihalagamage (2016). Control brown plant hopper on rice.Agri technology leaflet, No.04, 2016 March.DOA Publication.

Annex 2017 Publications

PUBLICTIONS AND PRESENTATIONS – 2017

- **Publications**

1. Hapukotuwa, N.K. and Perera, S.2017. Termiticidal activity of Bifenthrin and Ffipronil against mound building termite *Odontotermesredmanni*Wasmann.Annals of Sri Lanka Department of Agriculture 2017 19: 1-5

- **Presentations**

1. Weligamage S.S. (2017). **Farmer field school training to support the Promotion of Integrated Pest Management in Sri Lanka.** Asia Pacific Plant Protection Convention (APPPC) workshop on empowering farmers through farmer field IPM training, 27/02/2017-02/02/2017, Kathmandu, Nepal.
2. Ihalagamage, T. (2017). **Integrated Pest Management in Sri Lanka**. International training workshop for agriculture, 01/04/2017-15/07/2017,Giza,Egypt.
3. Ihalagamage, T. (2017). **Climate change effect on Agriculture in Sri Lanka**. International training workshop for agriculture, 01/04/2017-15/07/2017,Giza,Egypt.
4. Ihalagamage, T. (2017). **Develop a package of IPM for banana in Sri Lanka**. International training workshop for agriculture, 01/04/2017-15/07/2017,Giza,Egypt.
5. Nimalananda, H. (2017). **Vision for Sustainable Agriculture and challenges in Sri Lanka**. Workshop on Vision for sustainable agriculture and challenges, 04 May 2017, University of Neuchatel, Switzerland.
6. Hapukotuwa, N.K. (2017). P**lant Protection and Quarantine in Sri Lanka**. Workshop on Plant Protection and Quarantine, 17-30 August 2017, Taiwan, Republic of China.
7. Hapukotuwa, N.K. (2017). **Termiticidal activity of bifenthrin and fipronil against mound building termite *Odontotermesredmanni*Wasmann**. Annual Symposium of Department of Agriculture 8,9 September 2017.
8. Nimalananda, H. (2017). **Assesment of the quality of diagnosis and recommendations given at crop clinics Sri Lanka**: a comparison between e - clinics and paper based crop clinics. Thesis presentation, 12 November 2017, Switzerland.

- **Books**

  Weligamage, S.S, (2017). “Integrated Pest management for vegetables for Sri Lankan farmers-2

- **Leaflets/Technical notes**

1. S.S.Weligamage,S.S.K..Hemachandra, N.K.Hapukotuwa (2017). Control of invasive alien Molluscs (snails and slugs) in Sri Lanka.

2. S.S.Weligamage, M.S.K.K.Perera, N.K.Hapukotuwa (2017). Management of termites in Sri Lanka.

3. S.S.Weligamage, M.S.K.K.Perera, N.K.Hapukotuwa(2017).Management of storage pest: Cockroach in Sri Lanka.

4. I.Pussegoda. (2017). Management of yellow spotted locust in Sri lanka

5. I.Pussegoda (2017). Govithanatakem karma.

6. I.Pussegoda (2017). Wasawisenthoragewatta.

7. T.N. Ihalagamage (2017). Wee wagawehithakarasaththu- Kola Hakulanadalabuwa

8. T.N. Ihalagamage (2017). Wee wagawehithakarasaththu- Duburupalakeedawa

9. T.N. Ihalagamage (2017). Wee wagawehithakarasaththu- Purukpanuwa

10. T.N. Ihalagamage (2017). Wee wagawehithakarasaththu- Kopupanuwa

Annex 2018 Publications

PUBLICTIONS AND PRESENTATIONS – 2018

- **Publications**

1. Perera M.T.M.D.R. and Senanayake N. 2018. Time of release of larval parasitoid, *Cotesia plutellae* (Kurdjumov) for management of *plutella xylostella* L. on cabbage, Sri Lanka. Journal of food and Agriculture, 4 (Issue 1) p. 20-32

2. Perera M.T.M.D.R. and Senanayake N. 2018. Time of release of larval parasitoid, *Cotesia plutellae* (Kurdjumov) for management of *Plutella xylostella* L. on cabbage. Proceedings of the SLCARP *2nd International Agricultural Research Symposium*, 13-14 August, Colombo, Sri Lanka. 62p

3. Perera M.T.M.D.R. and Senanayake N. 2018. Biological Insect Pest Management in crops of Brassicaseae Family. Proceedings of the *9th International Agriculture Symposium* "*AGROSYM 2018*" 4-7 October , Jahorina mountain, Bosnia and Herzegovina.

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- **Poster Presentations**

1. Hapukotuwa, N.K, and Perera M.S.K.K. Abeysekara 2018. efficacy of the novel termiticide Dinotefuran 20% SG on mound building termite *Odontotermes redemanni* Wasmann in Sri Lanka. Annual Symposium of the Department of Agriculture, 6-7 September 2018.

- **Leaflets/ Technical noes / Newspaper articles**

1. Perera M.T.M.D.R. (2018) "ගෝවා වගාවේ දියමන්ති පිටැති සළඹයා සඳහා ජෛව්‍ය විද්‍යාත්මක පාලනයක් කෘෂි තාක්ෂණික තොරතුරු , තාක්ෂණික පත්‍රිකා අංක 01 – 2018 ජනවාරි "NAICC, Department of Agriculture, Peradeniya, 03pp.

2. Pussegoda I. (2018) Home garden pest management using natural pesticides.

- **Radio Programmes**

1. Participated at "Kadha Malla" at Swadeshiya Sewaya" on Permanent crop Clinic programmme conducted by PPS , DOA, Peradeniya aired on 14.08.2018 , 6.30-7.00 pm.

2. Participated at "Sannasa" at "Swadeshiya Sewaya" on Integrated pset management conducted by PPS , DOA, Peradeniya aired on 20.08.2018 , 7.00-7.15 pm.

3. Participated at "Boradiya Mankada" at "Rangiri Sri Lanka Radio" Dambulu ITN programme on recent BPH outbreak in Ampara District aired on 11.08.2018 at 7.30 am.

Annexure 02

Inventory of Machinery, Equipment and Structures

Item	Quantity	Model	Date of Purchase	Condition**
Machineries				
Drill machine	1	Hilti	2012.12.28	In use
Electric Hammer Drill	1	Makita S.N.001517	2005.12.22	In use
Power drill machine	1	Bosh	2000.12.29	In use
Generator	1	Honda	1992.06.10	In use
Grinder machine	1	Grad	1993.10.08	In use
Grinder	1	Universal-8MM drilling chick 1770 RPM 220 / 240V and 17MM two Opened Spanner	1984.07.30	In use
Soil Injector	2	Mo.KG.250	1992.06.10	In use
Power Sprayers (wheel barrow type)	2		2004.05.28	In use
Ground sprayers	4	Kubota	1992.06.10	2-In use, 2-need repair
Power Sprayer Knapsack	3	XF 787	2012.10.23	Need repair
Mist blower Hay spray	4		2000.05.31,2002.03.06	Need repair
Sprayer ED8.600 Knapsack	2		2011.06.16	In use
Equipment				
Analytical balancer	1	Radwag	2012.08.10	In use
Autoclave	1	Gemmy	2015.12.02	In use
Box (Insect Preserving Box)	25		2018.11.10	In use
Insect rearing cage 12"x12"	1		2018.11.10	In use
Insect rearing cage 8"x8"	7		2018.11.10	In use
Camera	1	Canon SN.498030001901	2013.09.03	Needs repair
Camera	1	Nikon cool fix SN.238060001103	2016.09.15	In use
Camera	1	Nikon SN.70033189	2011.07.11	Needs repair
Computers (Monitors)	7	Dell (02), HP (04), Acer (01)	2014.09.15,2014.09.15,2011.09.19	In use
Computers (Desktops)	10	DTK (01),Dell (02),Panora (02), HP (05)	2014.09.15, 2007.12.05,2011.09.19,2013.08.05	8-In use,1-condemn, 1-needs repair

Item	Quantity	Model	Date of Purchase	Condition**
Computers (Laptops)	10	HP (03), Dell (05), Ases (01), Toshiba (01)	2011.08.01, 2013.10.31,2015.09 . (HP), 2016.07.22, 2017.03.22, 2013.06.12,2013.09 .03 (DELL), 2016.09.26 (Ases),2012.12.21 (Toshiba)	4-In use, 6-need repair
Distilled water still	1	Manesty Type L4	1987.05.25	In use
Fiber insect (ladybird)	3		2013.03.20	In use
Forceps	3		1992.06.10	In use
Full face gas mask	4		2001.11.08	In use
Magnify lenses	23		2014.12.13	In use
Incubators	2	Gallenkamp, POL-EKO Aparatura	1987.03.04,2017.12 .28	In use
Sterilizing Oven	1		1992.06.10	In use
Microscopes	1	Olympus	1992.06.10	In use
Microscopes (USB)	3		2012.04.09 (01), 2013.06.12	In use
Microscope (Sterio)	1	Acxiom	2001.08.07	In use
Moisture Testor	2	Dole	1992.06.10	In use
Printers	9	HP Lesser Jet (01), Epson LQ 300+11 (01),HP Lesser Jet 400 (01),Xerox (02),Canon LBR-6230dn (03) & Laxmark ms 312dn(01)	2008.01.14,2011.07 .11,2014.01.22,201 4.07.15,2016.08.22, 2017.03.22,2017.03 .21	6-In use, 3-need repair
Photocopy machine	1	Canon JB	2013.08.06	In use
Projector Multimedia	1	FR. NE CVI 670	2004.10.25	In use
Digital Projector	1	BENQ MX662 S.N.PDX4DO2540000	2013.09.03	Needs repair
Projector screen	1		1992.06.10	In use
Scale (Electronic)	1		2013.12.31	In use
Scanner (Portable)	1		2013.06.12	Needs repair
Scanner	1	CN 382 WHOR9	2013.11.05	In use
Structures				
Biological control laboratory	1			In use

* Include those that are used for **Research and to provide services** such as Microscopes, autoclaves,sprayeers, net houses etc.

**In use/needs repair/ unusable/condemn

Annexures 03

List of Vehicles

1	Double Cab (Mitsubishi) PF - 8271	1	2015.01.13	In use
2	Van (Nissan) 62 – 8830	1	2013.04.09	In use
3	Jeep (Mitsubishi) 31-2625	1	1999.08.13	Condemn
4	Double cab (Toyota) 58-3946	1	2000.01.01	In use
5	Double cab (Toyota) 58-3942	1	1999.05.14	In use
6	Bicycle Hero S.N. 294183	1	2001.10.30	In use
7	Bicycle Hero S.N.J 451558	1	2001.10.30	Needs repair

Annex - 05

Key Activities Undertaken By Plant Protection Service - (2016-2018)

No	Programme /Project	Key Performance Indicator	Targets-2016	Achievements-2016	Targets-2017	Achievements-2017	Targets-2018	Achievements-2018
1	Implementation of Plant Protection Act No. 35 of 1999	Number of trainings conducted	2	1	2	4	2	2
		Number of participants (Officers)	100	71	100	264	100	207
		Number of new autherized persons appointed	100	71	100	119	100	207
2a	Promotion of Integrated Pest Management (IPM) for RICE	Number of trainings conducted	20	15	10	7	3	4
		Number of participants (Officers & farmers)	550	920	400	505	100	218
		Number of field days conducted	2	1	1	0	0	0
		Number of participants		35		0		0
2b	Promotion of Integrated Pest Management (IPM) for VEGETABLES	Number of trainings conducted	10	8	4	3	3	4
		Number of participants (officers & farmers)	550	1165	400	463	250	200
		Number of field days conducted	1	0	1	1	0	0
		Number of participants		0		40		0
2c	Promotion of Integrated Pest Management (IPM) for FRUITS	Number of trainings conducted	2	2	2	2	2	3
		Number of participants (officers & farmers)	150	188	100	150	150	80
2d	Promotion of Integrated Pest Management (IPM) for LEAFY VEGETABLES	Number of trainings conducted	8	9	0	0	0	0
		Number of participants (officers & farmers)	250	377	0	0	0	0
2e	Promotion of Integrated Pest Management (IPM) for HOME GARDENS	Number of trainings conducted	2	2	0	0	0	0
		Number of participants (officers & farmers)	100	120	0	0	0	0
3	Permanent Crop Clinic Programme (PCCP)	Number of clinics held	12	11	12	8	12	7
		Number of participants (officers)	300	548	300	382	300	395
4	Technical Assistance in	Number of trainings conducted	10	8	3	3	3	3

	Field Rodent Management	Number of participants (officers & farmers)	200	321	80	153	100	92
		Number of field days conducted	2	1	0	0	0	0
5	Biological control programme for Salvinia & water hyacinth	Number of water bodies	25	13	25	23	25	16
		Number of participants (farmers & officers)	100	45	100	244	100	116
6	Identification and Management of invasive alien species (IAS)	Number of trainings conducted	2	3	3	4	2	2
		Number of Participants	250	448	200	379	200	168
7a	Pilot Scale testing of Weedicides	Number tested		11		8		10
		Number recommended		9		8		10
7b	Pilot Scale testing of Termiticides	Number tested		2		2		0
		Number recommended		2		2		0
8	Technical Guidance to Manage Termites in DOA premises	Number of locations	As requested	3	As requested	5	As requested	5
		Number of trained people						
9	Technical Assistance in Fumigation of Seed Stores of DOA farms	Number of farms/stores	As requested	22	As requested	24	As requested	12
		Quantity (MT)		3021.1		4628.23		1833
10	Promotion of botanicals to home garden pest management	Number of trainings conducted	20	25	4	12	5	5
		Number of participants (officers & farmers)	800	1007	300	900	400	270
11	Pest Outbreaks	Number of programmes		1		1		1
12	Pest Surveillance Programme	Number of districts (data collection)	25	19	25	19	25	18
13	Control od Pest/Disease in Places with National Importance	Number of programmes	As requested	3	As requested	1	As requested	5