Investment Plan
Plant Health Component
(Final)

SU-T1084 (ATN/OC--SU)

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IADB

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Acronyms

ADRON	Anne van Dijk Rijstonderzoekscentrum Nickerie
CAHFSA	Caribbean Agricultural Health and Food Safety Agency
CARICOM	Caribbean Community
CBD	Convention on Biological Diversity
CFF	Carambola Fruit Fly
CPM	Commission on Phytosanitary Measures
EDF	European Development Fund
EU	European Union
FTD	Fruit flies per trap per day
GDP	Gross Domestic Product
GS	General Surveillance
IADB	Inter-American Development Bank
IICA	Inter-American Institute for Cooperation in Agriculture
IPPC	International Plant Protection Convention
LVV	Ministerie van Landbouw, Veeteelt en Visserij (Ministry of Agriculture)
NPPO	National Plant Protection Organization
PHS	Plant Health Service (of LVV)
PRA	Pest Risk Analysis
PVS	Performance Vision and Strategy (IICA)
SFF	Sapodilla fruit fly
SLM	Airline Agency and focal point for other airliners)
SPS	Sanitary and Phytosanitary Measures
SS	Specific Surveillance

Executive Summary

This investment loan proposal considers plant health as a subcomponent of a broader proposal aimed at increasing the competitiveness of the Agricultural sector of Suriname. The proposal anticipates funding by the Inter-American Development Bank (IADB). The proposal is set against the background of the agricultural sector performance and the major goals of the national agriculture master plan for the development of Agriculture in Suriname as defined by the government.

The plant health service, regarded as an institution that is critical to the realization of the government's goals is unable to give adequate support because of its low technical, managerial, administrative and operational capacity. The proposal therefore addresses human resources development consistent with the requirements to respond to its mandate as a National Plant Protection Organization. It targets the weak import regulatory system to prevent further introductions of quarantine pests as imminent threats that can cause serious economic damage to cultivated and natural plant resources if introduced. Securing the borders and establishing procedures for pest exclusion is among the priorities. Strengthening a deficient export certification system should result in market access and maintenance.

Other areas of concern include the absence of an institutionalized programme that should support a range of phytosanitary activities, supporting laboratory diagnoses, and the absence of purposeful fruit fly control programme capable of exploiting pest free areas and areas of low pest prevalence to boost fruit production and pave the way for exports.

The results matrix and the budget prepared detail inputs required per year over a five year period. The strategies for addressing the weaknesses of the subcomponent are considered technically feasible. Industry and the rural poor, the Government as well as the general population will benefit from a strengthened NPPO because of the wide implications of its functions for increased food production, exports, and food security in general.

1. Problem Description

A. Agricultural sector performance

Agriculture plays an important socio-economic role in Suriname. In the past thirty years the performance of the sector has been erratic, showing a slowdown pattern in agricultural growth during the 90s and slow recovery at the beginning of the past decade. Agriculture accounts for 10% of total export earnings, second to mining and 17% of the labor force. The share of agriculture in total GDP has been decreasing slightly in recent years and represented 9% in 2014 (Suriname Central Bank, 2014).

Information obtained from the Statistical Department of the Ministry of Agriculture (Annex 1) shows that the total land area under production has improved from 60,300 hectares (ha) in 2010 to 70,728 ha in 2014. Small scale farming has improved slightly from 30.269 ha to 33,022 ha from 2010 to 2014, while large scale farming has increased over that period from 30,050 ha to 37,706 ha. The main crops continue to be rice with an acreage of just over 62,000 ha and bananas (including plantains) about 3,000 ha. This is a positive trend and may have implications for export volumes and market access. Currently there is no very clear trends in exports except for rice and bananas (Table 1)

Table 1: EXPORT QUANTITIES AND- VALUES OF AGRICULTURAL PRODUCTS

DEFINITIONS	UNIT	2009	2010	2011	2012	2013	2014
QUANTITY:							
Rice	Ton	51.941	89.412	46.109	56.317	77.161	103.755
Bananas *	,,	58.132	70.239	68.138	62.213	76.585	75.261
Vegetables and tubers	,,	2.757	3.239	2.723	2.476	2.806	2.717
Fruit (excl. banana)	,,	160	1.122	1.006	611	579	431
Processed vegetables, fruits and plant parts	,,	339	401	792	1.409	648	409
Flowers/Ornamentals	,,	145	102	139	92	54	49

Source SAIS LVV

The major goals of the national agriculture master plan for the development of Agriculture in Suriname (March, 2016) are defined as (a) transition from a Subsistence Agriculture System to a Modern Industrialized, Knowledge-intensive, and Commercial Agricultural System linked to global markets and (b) An Agricultural Sector that contributes to national macro-economic growth, including GDP, Trade Balance, Employment and Food Supply.

The challenge and the vision as stated in the master plan are as follows:
..to improve the condition and stability of the national economy through agricultural production for import replacement and for export, transforming Suriname into the primary food supplier for the region and a major player in CARICOM and even in the European market. Simultaneously, the Plan aims to integrate agriculture and society in a manner which contributes to employment and maintains the stability of social structures.

The objectives of this plan include replacement of food imports with local supplies: both fresh & processed (improved balance of payments), increased value added products from sector, increased exports of selected fresh and processed products, transitioning to large business units, relatively large farms & increasing use of greenhouses and diversified crop profile: Citrus, vegetables, roots, coconuts, cacao.

B. Situation in the Plant Health Service

The Plant Health Service (PHS) of LVV is a department that was set up by the Government to safeguard natural plant resources and agriculture from the introduction and spread of pests. Its functions are largely regulatory supporting safe international and regional trade through the regulation of imports of plants and plant products as well as certification of plants and plant products for export. Its actions against domestic plant pests should promote high quality, high yields and food security.

The institutional context of the Plant Health Service is explained in Figures 1 and 2**.** Figure 1 describes the organizational structure of the Ministry of Agriculture. The Director of Agriculture is responsible for the Extension Service, Documentary Information Services, Internal Control, Legal Services and Deputy Directorates. Deputy Directors of Directorates report to the Director of Agriculture. These Directorates include Livestock, Fisheries, Agricultural Research, Marketing and Processing, Agriculture, Administrative services and Planning and Development.

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Figure 1: Organizational Structure of the Ministry of Agriculture

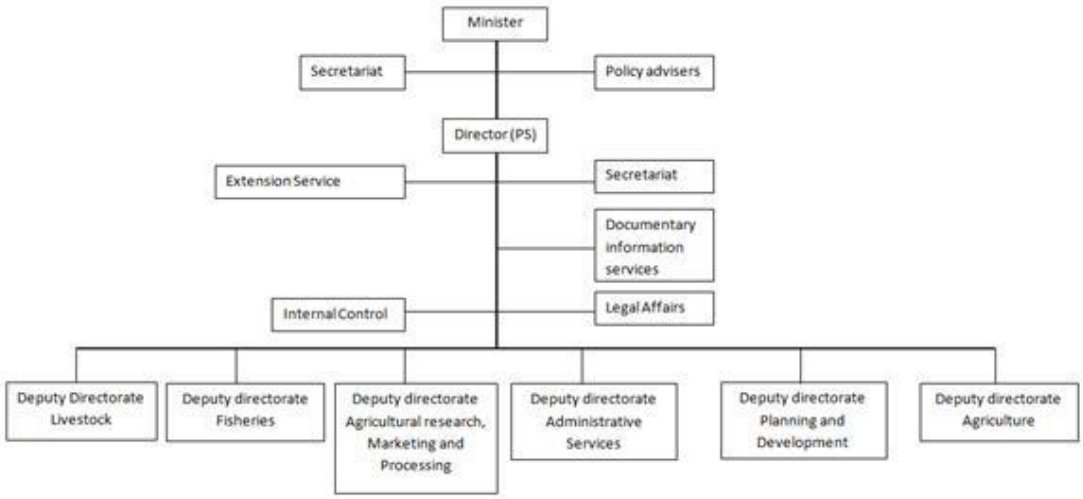


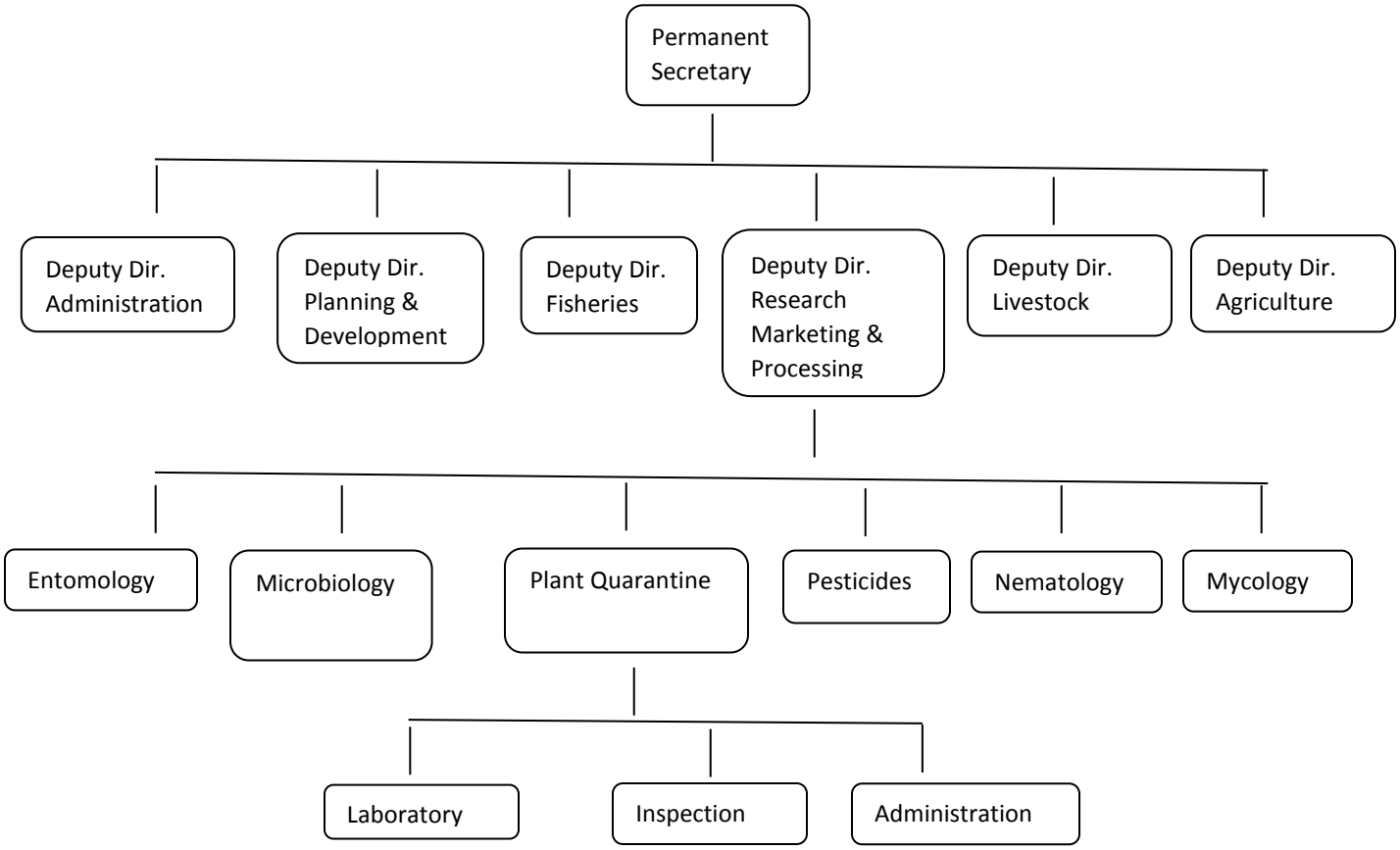
Figure 2 shows the Deputy Directorates and the relationship with PHS and other departments.

The Deputy Directorate of Research, Marketing and Processing is directly responsible for six departments, namely Entomology, Microbiology, Plant Quarantine, Pesticides, Nematology and Mycology. These departments were set up to conduct applied research for sustainable development of the agricultural sector through the execution of specific research programs under each discipline.

The microbiology and mycology provide services mainly to food safety and veterinary services. The entomology conducts research on insect pests in agricultural crops and their control.

The nematology department conducts research on plant parasitic nematodes and propose treatments to farmers. The mycology/bacteriology laboratory conducts research, diagnoses and provides information on bacteria and fungal diseases and their control.

Figure 2: Departments under the Permanent Secretary



The Pesticides Department was set up to ensure the implementation of the pesticide policy. It provides information and advice to farmers, users, students, retailers and importers about pesticides. It is also responsible for the fruit fly management programme. Table 2 shows the staffing and financial allocations of each of the departments of LVV. Most of these departments have a specialist qualified at the level of a BSc and one assistant.

Table 2: LVV Departments staff and budget for 2014 (Source LVV)

LVV DEPARTMENT	Staff	qualifications	BUDGET 2014 (SRD) excluding Salaries	% OF TOTAL DEPARTMENT'S BUDGET
Entomology	1 Entomologist	BSc, University of Suriname – Agricultural Production	14750.00	1.48%
	1 assistant	NATIN		
Nematology	1 Nematologist	Lcs/BSc University of Suriname	5100.00	0.51%
	1 assistant	NATIN		
Virology/pathology		None		
Pesticides	1 Pesticide/Fruit fly Specialist	BSc, Higher Agricultural School Nederland	116500.00	11.7%
	1 assistant	NATIN		
Mycology/Bacteriology	1 Mycologist	BSc, University of Suriname – Agricultural Production	10600.00	1.1%
	2 assistants	High school		
Plant Health	1 Crop Protection Specialist	MSc, University of Dominican Republic	222150.00	22%
	1	BSc, University of Suriname – Agricultural Production		
	1	PTC- Agribusiness		
	6	inspectors		
Total budget 2014 of Research Department	All the other departments included with office and transportation costs.		**999.840.00**	

The quarantine department has the major share of the resources with 22% of the total budget of the research department. This department is set up to regulate plants, plant products and other regulated articles capable of carrying pests entering and leaving the country through official border points of entry/exit. In this regard, it issues import permits, inspects imports of agricultural commodities, inspects and certifies products for exports.

PHS with its current limited capacities and weak infrastructure cannot effectively support the Government's objectives as outlined above. Technical capacity in critical functional areas range

from 10%-39% (IICA-PVS, 2013). The various designated research departments act almost independently of each other and are in themselves very poorly facilitated. Weaknesses include open porous borders, inadequately trained personnel, inability to respond in a timely manner to national and international obligations, spatial and logistical problems resulting from inappropriate structure.

One of the main obstacles to agricultural competitiveness in Suriname is the inadequacy of the Plant Health Service to function fully and effectively as a government Department to support the national objectives as well as to fulfil its international obligations related to the introduction and spread of plant pests. The Inter American Institute for Cooperation in Agriculture (IICA) conducted an evaluation of the capacity of the Plant Health Service in 2013, using the Performance, Vision and Strategy (PVS) evaluation tool. The results generated from this evaluation really reflect a very poorly organized and ineffective Service. For instance, Technical capacity was rated at only 25%, human and financial capital was rated at 39% (the highest rating of any of the components examined, interaction with private sector and market access rated at 29% and 27% respectively. A breakdown of the Technical capacities in functional areas is shown in Table 3 below.

Table 3 Technical Competencies of the PHS as measured by the PVS-IICA

Technical Area	Level of Competence
Surveillance	28%
Diagnostics	28%
Risk Analysis	27%
Emergency Response	35%
Quarantine	28%
Emerging Issues	17%
Technical innovation	10%

In all of these areas of weakness, the consultant's recommendations and solutions as given in other sections are consistent with those of the PVS.

C. Results, Gaps and Lessons Learnt

The results of an ineffective Plant Health Service can be analyzed by examining some critical specific areas of responsibility:

I. Import regulation

Suriname imports high volumes of a variety of plants and plant products from many countries around the world and imports from each point of origin brings with them different levels of risk of introduction of pests associated with commodities. Weaknesses in the capability to manage those risks are evidenced by the porous borders which are official points of entry, ineffective regulation of imports, the absence of a regulated pest list as well as unjustifiable import requirements where they exist. Consequences of such weak import regulatory system have resulted in the introduction of several quarantine pests that have had devastating consequences on the economy. The examples discussed below are but a few which add to the pest burden of agricultural producers and farmers.

The tomato borer in around 2009/2010. This pest devastates the tomato industry where ever it occurs and is now doing the same in Suriname. It accounts for about 40 – 50% losses in tomatoes in Suriname at the moment.

The pink hibiscus mealy bug was introduced to Suriname in early 2000s and is known to affect a wide range of crops, ornamentals and natural forest trees, but its impact has not been assessed. This pest has had devastating consequences throughout the Caribbean countries where it occurs. For example, Grenada reported economic losses of $3.5 to $10 million for the 1996/97 season, and Trinidad and Tobago estimate potential losses exceeding $125 million/year if infestations continued to escalate (USDA 2010). A guestimate for Suriname based on the host plant affected and the production levels of various important hosts may be about US$10 million per year.

Moko disease discovered here in 2014 is the latest known pest to be introduced and now threatens the banana industry. Several areas of infection across the plantation were removed to avoid rapid spread throughout the plantation. Training staff in methods of containing the disease and implementing sanitary standards such as clean tools, sanitized clothing, disinfected vehicles and equipment have had to be introduced. Quite apart from the cost of managing the disease, the major producer of bananas has already lost about 400 ha to the disease and consequently 600,000 boxes of bananas since the introduction of the pest (FAI, 2016). Fortunately the major markets have not at this point reacted to its presence in Suriname. The spread of this pest can have serious economic consequences for the industry.

Unregulated movement of rice from Guyana has allowed the introduction of several virulent strains of rice blast to Suriname resulting in increasing losses to the rice industry (ADRON). Estimated losses per year are about 40% with variability in some years depending on weather conditions where blast disease may increase losses to between 50-60% in some fields (ADRON). This translates to about US$30 million in annual losses (ADRON)

It is important to recognize imminent threats to agricultural production in Suriname. The pattern of movement of people, produce and carriers into Suriname are pathways for the introduction of certain pests. These include for example:
The very dangerous **Panama disease race 4** for which the entire Caribbean should be on high alert. "*If Panama disease continues to spread, it will have disastrous consequences for both the export sector and for the food security of millions of people. The export sector accounts for 15% of the production. The other 85% of bananas are produced for local consumption. A large proportion of these cultivars, and also cooking bananas, are susceptible to Panama disease. More research is needed to find out which varieties are susceptible, and to what extent. We also need a rough overview of where these vulnerable varieties are grown to analyze the risks and devise plans to prevent the disease from spreading…*" (Luud Clercx 2015, Panama Disease News Letter)

The Khapra beetle is one of the world's most feared stored-product pests. In fact, it has been described as one of the 100 worst invasive species worldwide (Lowe et al. 2000). It is known to disrupt international trade because of its notoriety as a quarantine pest. "*The **Khapra Beetle (**Trogoderma granarium**)** is one of the world's most destructive pests of stored grain products and seeds. Its feeding damage often spoils 30 percent of the product; up to 70 percent damage has been reported. Previous U.S. detections of this tiny beetle have required massive, long-term and costly control and eradication efforts. Established infestations are difficult to control because the beetle can survive without food for long periods, requires little moisture, hides in tiny cracks and crevices, and is relatively resistant to many insecticides and fumigants* "(USDA). It must be kept out if markets for Suriname's rice are to be preserved. I has been introduced into and eradicated from several states during the period 1953-1983. *T. granarium* has been intercepted at ports of entry in the United States through inspection activities of Plant Protection Officers and recorded in the automated Port Information Network. A total of 407 interceptions was reported during 1985-1998. Of the intercepted cargo containing khapra beetle (63%) arrived through airports and (36%) through maritime ports. The risk of introduction remains high risk for the entire region based on several PRAs done on this pest for the region.

The giant African Snail is ranked among the world's 100 worst invasive species consuming at least 500 different plant species including papaya, beans, peas, cassava and peanuts. It has already invaded and caused havoc in many Caribbean countries including Barbados, and should be regarded as an imminent threat. No emergency response strategy is in place should these events occur in Suriname (LVV).

II. Export Certification and Market Access

The capacity of the Plant Health Service to certify exports and exploit markets is rated as 24% (IICA PVS 2013). Table 4 shows the number of notifications received from the EU alone since 2013 for the export of fruits and vegetables. Notifications are issued for **significant** cases of non-

compliance, and normally result in rejection of the consignment. The number of notifications suggest an unacceptable level of product certification and threatens continued access to existing markets and the expansion of market access. The range of pests, the commodities from which they were intercepted as well as the non-pest reasons for notification demand a complete overhaul of the certification system to ensure some level of credibility of the Plant Health Service of Suriname is achieved and that markets remain open to Suriname for exports of these fruits and vegetables.

Table 4: Notifications of non-compliance from the EU

Year	Shipments inspected	No of interceptions	Main pests intercepted	Main commodities
2016		21 (up to September)	Spodoptera spp. Anastrepha spp Bactrocera sp Thrips palmi Bemisia tabaci Lyriomyza sativa	Capsicum spp (peppers) Solanum sp (tomatoes, potatoes) Mangifera indica (mangoes Cucurbitae (cucurbits) Momordica sp Cestrum
2015	260	24		
2014	288	12		
2013	209	24		
	Other reasons for interception		1. False information on phyto (capsicum) 2. noncompliance with special requirements (wood packaging material) 3. incorrect identity declared on documents phytosanitary certificate absent (Cucurbitae)	

Source: Europhyt and Dutch Plant Protection Organization

III. Surveillance

The absence of a national surveillance programme undermines the total effort towards effective import regulation. Surveillance data underpins for example pest risk analysis, the preparation of regulated pest lists and commodity pest lists, setting justifiable measures for imports, establishment of eradication programmes, establishment of pest free areas, areas of low pest prevalence, pest free sites and places of production and export certification. Currently the exploitation of all of these components are badly affected by the absence of surveillance data. Further, in the absence of a surveillance programme, Suriname cannot respond in a timely manner to imminent threats from introduced pests.

IV. Limited diagnostic capacity

Results of diagnoses are often unreliable and inaccurate; response time is unduly long and lead to complaints by clients (PHS). Documented laboratory procedures are absent. A Plant Health diagnostic laboratory is nearing completion and needs to be well equipped, well managed and

appropriately staffed and, with appropriate documented laboratory procedures. A functional Plant Health diagnostic laboratory is critical for supporting phytosanitary decision making in response to imported and exported consignments. It provides rapid and accurate diagnosis of pests, records and maintains data on pest occurrences, detects and tracks new and invasive pests, facilitates responses to clients and delivers timely and cost-effective services.

The Commission on Phytosanitary Measures (CPM) 2014, noted the following:

- pest diagnosis underpins most International Plant Protection Convention (IPPC) activities.
- In order to take action against a pest, it must be accurately identified.
- To enable safe trade, pest diagnosis must be completed quickly and to a high level of confidence.

Based on these observations, the CPM encouraged its contracting parties to ensure there are adequate laboratory facilities and expertise to support pest diagnostics and taxonomic activities with sufficient allocation of resources.

V. Unfocused fruit fly programme

A fruit fly research programme exists focusing mainly on the carambola fruit fly and its effect on cultivated host crops. The current programme lacks a sense of purpose and is not coordinated by the NPPO. A purposeful fruit fly programme may be exploited for establishing for example pest free areas and areas of low pest prevalence to contribute to import substitution and possibly provide a basis for increased production and exports.

VI. Pesticides Management

Pesticides are imported, distributed and used without a management regulatory system. Plant health, animal health and public health operate independently in the absence of a pesticides management board. Unregulated import, use and application of pesticides, inappropriate pesticides selection for treating crops, harvesting times after treatment may all have serious implications for animal and human health and the environment. There have been documented cases for example of pesticides in food causing illness in the local population as well as tourists (J Wijngaarde, pers com). The absence of an effective regulatory system for managing pests may compound pest problems rather than solve them.

Gaps in the Service

It is difficult to identify gaps in a service that has not been properly established neither purposefully functional. The results of the PVS–IICA supports this view, showing the very poor performances in all indicators used to measure capacity. It is perhaps better to perceive an intervention in context of setting up an institution capable of performing functions that are consistent with the national and international expectations. In this regard, some of the core issues have been described above.

Lessons Learned

Observations from previous missions involving the preparation of policy papers under the Project SU-L 1032, as well as from this mission have revealed some very important issues from which the following lessons can be learnt:

- Suriname as a contracting party to global treaties has not yet made the necessary technical, administrative and legal adjustments to enable it as an agricultural economy to reap the benefits of these international treaties.

- A regulatory department cannot function with insufficient and undertrained staff in a highly competitive global system in which international standards apply.

- Technically justified phytosanitary measures are at the core of managing phytosanitary risks and such measures are not in place because of the absence of underpinning phytosanitary programmes.

- Government priorities and programmes cannot be supported by a weak regulatory institution which exposes the country's agricultural and natural resources to serious consequences of introduced pests.

- Management of the Plant Health Service and accountability remain as core issues to success and sustainability

D. Link to Policy Loans (SU-L1032)

Under the policy loan SU-L1032-modernizing the Plant Health Services of Suriname, the government was assisted in fulfilling six plant health policy conditions namely the development of

- a plant health strategy

- organizational structure of PHS
- a five year plan for capacity building
- a pest surveillance strategy
- phytosanitary protocols and rules of procedure for border control and
- pest status determination.

Donors Activities current and future

Apart from the ongoing engagement with the IADB in previous programmes (SU-L1032, SU-L1033), Suriname is engaged with the EU under the programme EU-SURINAME Cooperation/11th EDF Agricultural programme formulation i*ncreased production and export of horticultural crops and food safety standards.* All these projects are ultimately driven by Suriname's need to boost agricultural competitiveness and improve food safety, and are aligned with the focus of the current loan investment proposal by the IADB. FAO remains a partner in capacity building in Agriculture. IICA has been providing support to the region including Suriname in various ways on request, and the positioning of the headquarters of the Caribbean Agricultural Health and Food Safety Agency (CAHFSA) may be strategic and likely to positively impact Suriname's agricultural competitiveness.

II. Problem Solution, the Project – Subcomponent

A. Objective of the Plant Health Subcomponent

The modernization of the Plant Health Service (PHS) of Suriname is a fundamental pillar in the Government's achievement of its stated goals and objectives for improving agricultural competitiveness, productivity and food security. Hence the primary objective of this plant health component is to transform the plant health service into a fully functional National Plant Protection Organization as defined by the International Plant Protection Convention (IPPC) so that it can effectively implement its functions in support of government's policies and fulfil its international obligations as required by international treaties to which the Government of Suriname is a contracting party.

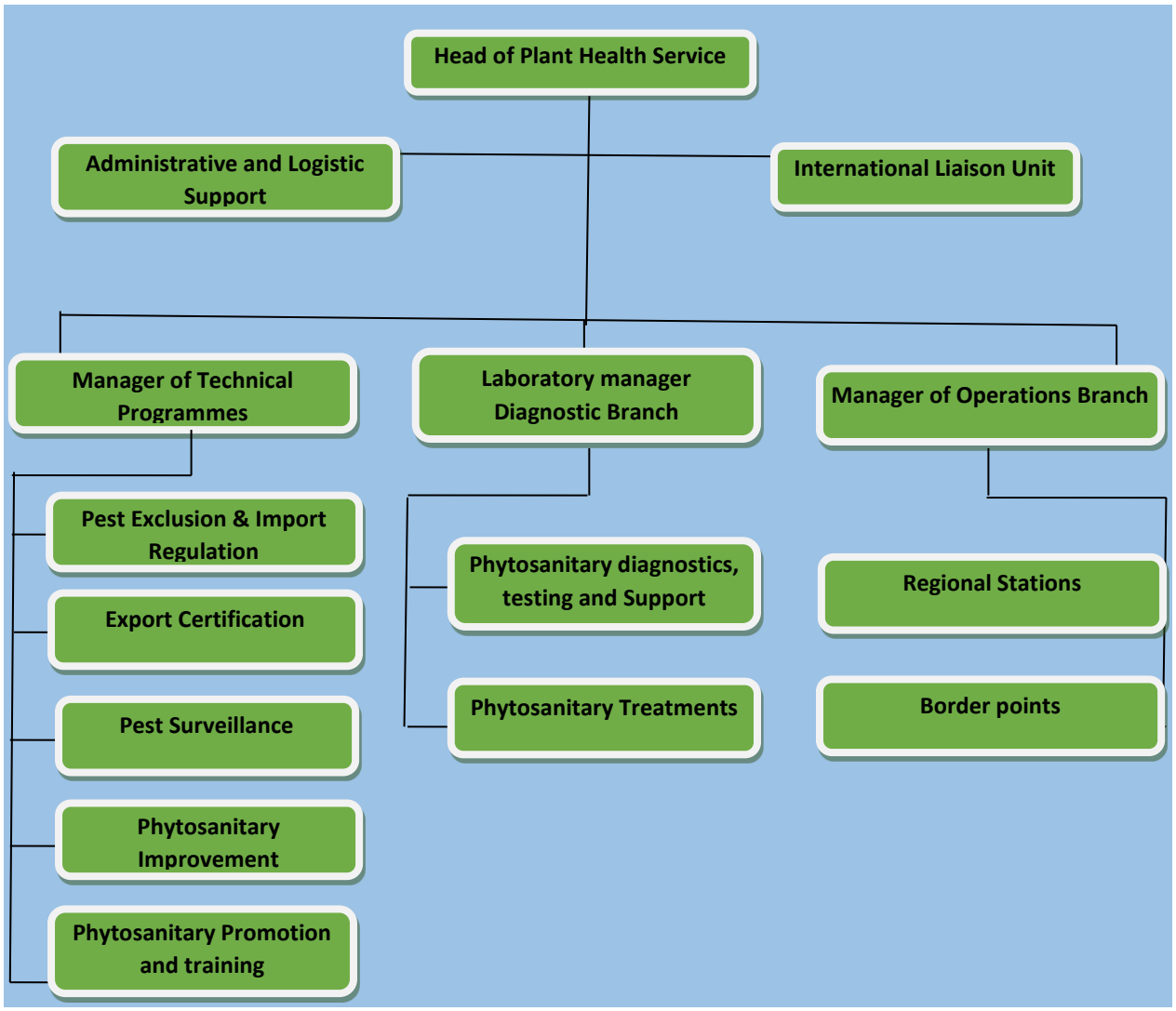
B. Plant Health Subcomponent and strategy

The proposed strategy addresses the key issues detailed above. These include:

- Establishing SPS control infrastructure and systems at the borders for effective regulation of imports
- Strengthening import regulation and procedures to minimize risk associated with imported commodities and movement of people
- Strengthening the export certification system to bolster exports, access and maintain markets
- Establishing and institutionalizing a pest surveillance programme to deal with the priorities identified in the related policy paper as well as emerging issues
- Establishing a diagnostic plant health laboratory to provide timely diagnoses with a high degree of confidence to support the selection and application of phytosanitary measures. The superstructure has already been constructed but needs to be equipped and made functional
- Establishing an area of low pest prevalence against fruit flies as a pilot programme that may lead to further exploitation of the measure to boost exports and food substitution
- Human resources development for effective action at all levels of the organization
- Establishing capability for independent and credible certification of rice quality within the laboratory complex as falls within the mandate of the NPPO
- Establish a Pesticides Management System that regulates imports distribution, use, storage and disposal of chemicals used in plant health animal health and human health

The plant health activities to be financed have been prioritized in the policy strategy papers developed under **SU-L1032** and approved by the Government of Suriname, and they take into account the total phytosanitary capacity of the country in order to determine the developmental context for LVV.

Fig 3: Proposed Organizational Structure of the Plant Health Service as the NPPO



I. Establishing SPS control at the borders for effective regulation of imports **(US$557,000)**

An integrated approach which includes plant health, animal health and food safety will be used for efficient and cost-effective border control. Facilities will be provided at all official borders and inland control posts. These will include for example, buildings (or modification of border structures that already exist) equipment and facilities for inspector operations. Provisions are based on the volumes of plants, plant products, animals, food and regulated articles moving into and out of each port, the perceived as well as actual level of risk, logistics and infrastructure. Annex 2a shows the volumes of traffic at each port and annex 2b shows the quantities of animal

and food products imported. Animal imports include pets, horses and cattle. Various types of food products come through all of the entry points. A map showing the entry points in Suriname is shown in Fig 4

Fig 4: Map of Entry points in Suriname

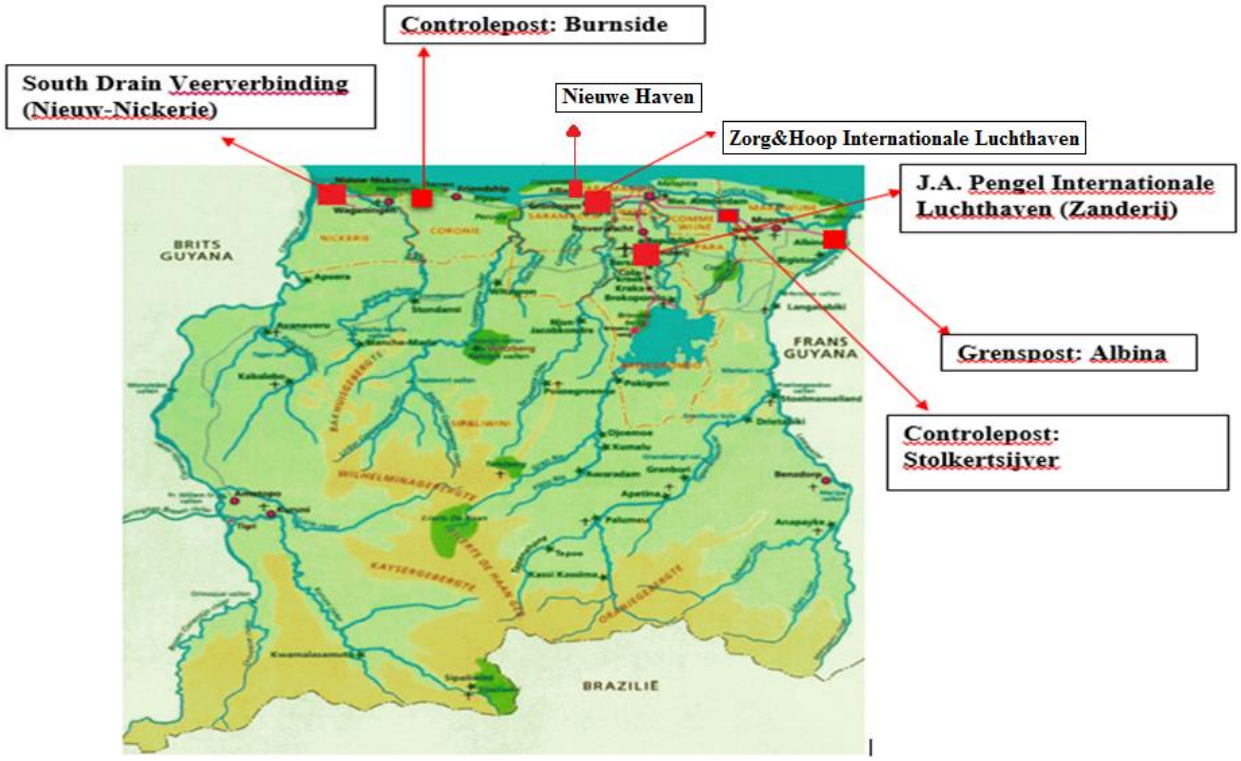
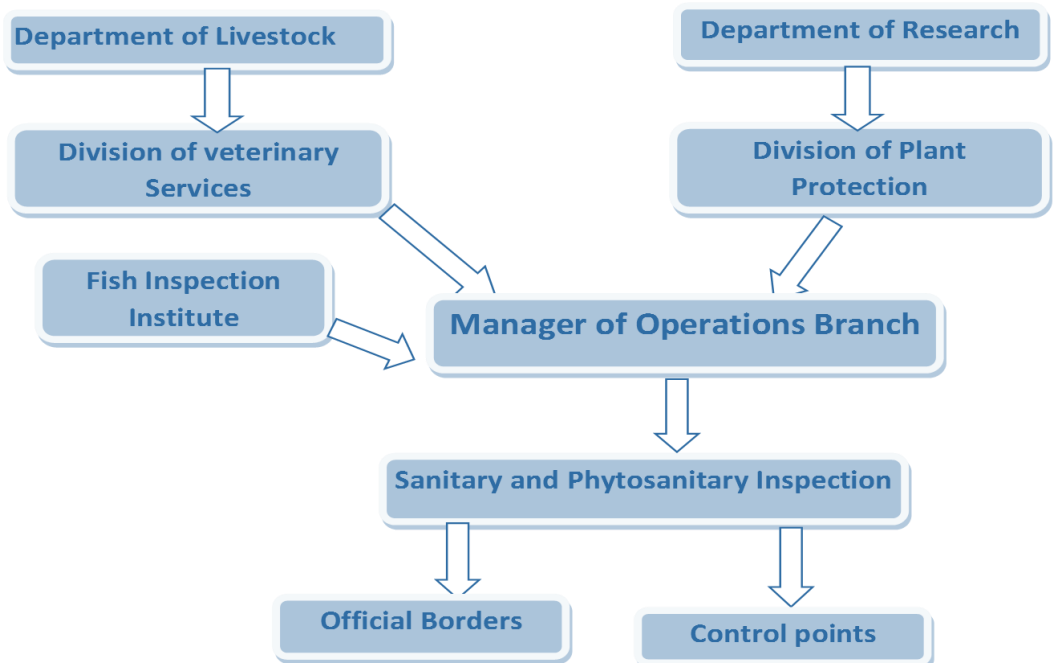


Figure 5: SPS Border Management



The costs for establishing facilities at the seaport, airports and land borders are summarized in Table 5 and detailed in Annex 3. These are based on defined and identified infrastructure developed by LVV in collaboration with the border agencies committee which includes Customs, Ports Authority, Department of Fisheries (LVV), SLM (Airline Agency and focal point for other airliners). The cost of equipment and infrastructure necessary for the airport is inflated by the inclusion of a scanner which can detect regulated articles and is estimated at about US$120,000 as well as a quarantine facility and incinerator.

Table 5: Infrastructure and equipment needs for border control

J.A Pengel Airport	Existing	To be purchased/Installed	Approx. Cost (US$)
	None	PHS Inspectors Office and operating area accommodated within current structure, and quarantine Facility	150,000
Total Equipment			177,900
Nieuwe Haven Seaport			
		Inspectors Office and operation areas to be constructed	50,000

Total Equipment			**42,650**
Zorg en Hoop airport	**Existing**	**To be purchased/Installed**	**Approx. Cost (US$)**
	inspection station	**Working unit**	**5,000**
Total Equipment			**1,750.00**
Nickerie land border and Ferry; police command post			
		Customs building and facilities will be upgraded	**25,000**
Total Equipment			**39,600**
Albina border crossing and Ferry			
		Current building for Customs will be upgraded	**25,000**
Total Equipment			**41,100**

II. Strengthening import regulation **(US$190.000)**

Activities will involve conducting pest risk analyses as the basis for setting import requirements against which import verification procedures will be developed, establishing and operationalizing a PRA team, determining and updating the list of pests to be regulated on various commodities from different countries, determining and applying phytosanitary measures, enforcement, non-compliance and emergency responses, as well as identifying and strengthening inspection and pest exclusion capabilities at all ports of entry. These activities will be central to effective import regulation and will require the inputs of a phytosanitary risk analysis consultant initially and for a period of time to guide these functions.

III. Export certification **(US$200,000)**

This programme will strengthen the NPPO's capacity to certify exports so that they meet importing countries' requirements. Activities will include developing pest/commodity-specific inspections procedures for the entire chain of the certification process, exporter/producer registration and field Inspections, third party authorization and supervision, incidents review and strengthening the relationship between producers, exporters for greater cooperation in certification of products to be exported.

IV. Pest Surveillance **(US$300,000)**

Priorities were identified in the pest surveillance strategy developed and approved by the Government in 2015. These include black sigatoka and Fusarium race 4 for bananas, Khapra beetle usually associated with grains, giant African snail, strains of rice blast, fruit flies and tomato stem borer.

General and specific surveillance activities will be done in order to establish both commodity and regulated pest lists; delimiting and monitoring surveys for pests; pest threats will be identified;

preparation of emergency responses and strengthening data management capabilities. Surveillance equipment needs are given in Annex 4.

V. Completing a plant health diagnostic laboratory **(US$300,000)**

The plant health laboratory superstructure near the harbor. The project will pay for installation of work stations, benches and desks, shelves, cupboards and electricity and equipment. Diagnostic equipment needs are detailed in Annex 5.

VI. Establishing an area of low pest prevalence against fruit flies **(US$137,000)**

Alliance plantation in Commewijne, an area of intensive citrus fruit production has been identified through the ongoing carambola fruit fly project, as the most suitable site to establish an area of low pest prevalence. It is the largest site of concentrated production of citrus. The total area is 2,200 ha of which 110 ha is already planted. The area was selected based on its degree of isolation and geographic design (major part swamp forests, low human population, thus few other hosts), only reachable by boat. Removal of alternate host species and male annihilation technique using well established methods of **lure and kill** will be central to the pest reduction strategy. Current levels of pest infestation are also relatively low (for CFF-1.67 flies per trap per day (FTD); for SFF, the FTD IS 0.07) and expected to respond to the selected pest reduction methods applied. To achieve ALPP as defined by the IPPC, the FTD values should be no more than 0.01. The owner of the plantation is expected to contribute in kind by making a boat available for surveillance in areas only accessible by boat. He will also designate 5 persons to be trained to assist in setting and servicing traps as well as data collection and removal of alternate hosts in and around the selected site.

The programme will be managed by a national fruit fly specialist with support from an experienced fruit fly technician currently employed by LVV. The Terms of Reference are given in Section G. It is estimated that the strategy will result in achieving the required level of reduction of 0.01 fruit flies per trap per day within the first two years after which maintenance of the

target status must be maintained for the next 3-4 years and reflected in the surveillance data.

Other areas that might be suitable for the establishment of ALPP is Nickerie and, Tibitie where a new orchard is set up (van der Werff). The successful demonstration of the ALPP as a phytosanitary measure that leads to increased harvestable yields and fruit improved quality may have implications both for increased production by this and other farmers that may lead eventually to market access.

The proposed methods are widely used in area wide pest management programmes. The lure and kill technique is environmentally friendly as the chemicals are contained in traps and not disposed of in the open environment. Further, these methods are in compliance with

recommendations of the IPPC with due regard for the environment. Table 6 summarizes the requirements for such a measure.

Table 6: Characteristics and Requirements for ALPP

Establishment of Area of Low Pest Prevalence (ALPP) vs fruit flies in Suriname (Pilot Project)		**Cost US$ over 5 years**
Objectives of establishment of ALPP	To establish an ALPP as part of a systems approach in a pilot area to increase harvestable yields of citrus	
Proposed Location	Alliance, Commewijne	
Area (HA)	2200 ha of which **110 ha** planted	
Target fruit/crop in that area	Citrus	
Production volume	3 ton/ha citrus (below the average)	
Target fruit fly species	Carambola fruit fly (CFF) and sapodilla fruit fly (SFF)	
No of persons employed or affected	33 persons of which 14 female	
Current level of infestation	CFF: Flies per trap per day (FTD) 1.63; SFF: FTD 0.07	
Target level of infestation	CFF: FTD 0.01: SFF: FTD 0.01	
Expected duration (years)	1.0 year for SFF; 1.5 years for CFF for establishment of ALPP, 3-4 years maintenance	
incremental decrease in infestation expected per year	Depends on the starting season. Peak populations of CFF occur in months April-August.	
Measures to be applied for reaching the desired ALPP	Removal of all primary and secondary hosts of both fruit flies in and around the plantation. Trapping in orchard (as free area –systems approach), Male annihilation technique Trapping around orchard (as ALPP), including surrounding plantations and villages. Additional measures as systems approach: sorting of fruit (post-harvest treatment)	
Resources Requirements	**Trapping material**	
Traps (type) and no. per year	Jackson traps, complete 200/year Multilure traps 150/year	10,000
Lures and amount per year	Putrescine/ammonium acetate- 3000 litres Methyl-eugenol- 20 liters; Torula yeast - one drum	60,000
Manpower	One NPPO person in charge of trapping; 3 extension personnel (already employed) One National Fruit fly Consultant	41,000
Contribution of target owner	5 designated personnel to assist in setting, servicing and data collection owner's boat for surveillance in areas inaccessible by road	
Protocols/manuals Training personnel involved	ISPM for ALPP for fruit flies; Manuals for CFF surveillance	10,000 8,000
Other resources	Article on *host plants of carambola fruit fly*. Research on infestation of fruits from Alliance	
Justification for the choice of location	The establishment of the ALPP is possible due to the geographic design of the area (major part swamp forests, low human population, thus few other hosts) only reachable by boat.	
Possibilities for application beyond the pilot	A second large citrus plantation is presently established in the interior, also a location with already a minor infestation of the target fruit flies.	
Transportation	1 motor bike.	8,000
Estimated cost of the programme		**137,000**

VII. Human Resources Development **(US$284,000)**

The project will pay for five subject specialists to be trained at the level of a Master's degree. The head of the Plant Health Service will be trained in Management of an NPPO. Two laboratory technicians will be trained in laboratory procedures, inspectors will be trained in biosecurity for more efficient staff deployment, and other personnel as detailed in Annex 6. The scheduling of training activities would be done so as to minimize disruption in the plant health service. Training for specialists will be organized so that course work is done at the University of the West Indies and the research component will be done in Suriname.

Rice quality management **(US$40,000)**

The laboratory complex at LVV includes facilities for rice quality management. The facility will require approximately US$40,000 in equipment to be operational. Training will be provided for one laboratory staff to conduct the related operations.

VIII. Pesticides Management Programme **(US$264,000)**

Pesticides legislation have addressed various aspects of pesticides regulation as shown in the Table 7. The project will pay for the establishment of a pesticides management system [managed by a pesticides control board (PCB)] and the regulation of pesticides for plant, animal and human health. The PCB will include representatives from LVV, Ministry of Health, University, Ministry of the Environment and Industry. The proposed management [PCB] will regulate, in the public interest, the import, distribution, storage, transportation, disposal, use and application of pesticides to control pests for human, veterinary and plant health. The Board would receive applications for importation of pesticides, review pesticides information and labels, grant import licenses, register pesticides imported as well as the importers, set procedures for use, disposal and application of approved pesticides, train pesticides users, applicators and distributers and, promote and monitor compliance at all stages from application to disposal. The PCB may charge clients for services to sustain its regulatory activities.

Table 7: Legislative provisions for pesticides management

Current policy on pesticides management with accompanying legislation or decree	
Importation regulation of pesticides in Suriname	Article 5, lid 1, Pesticide Ordinance 1972- Pesticide decree 2005, no21, article 12-20 (definition)
Prohibited pesticides	- Decree negative list 2003, goods of PIC list FAO - Changes pesticide Ordinance 2005, no 18, goods of PIC list, FAO - Changes pesticide ordinance, 2005, no 18, and negative list Feb. 2006, incl. Methyl bromide; 2011, including endosulfan and others
Ban on use of prohibited pesticides	- Changes pesticide ordinance 2005, no 18, PIC list, FAO - Pesticide order April 16, 2015, no 65
Labelling, pictograms	- Pesticide decree 2005, no 21 article 6-7
Labeling, other indications of danger	- Pesticide decree 2005, no21, article 8-9 - Pesticide order 2008, article 6-11 - Pesticide order on labelling, sept 2008
Labeling language	- Pesticide order, article 10 - Pesticide order Labeling, Sept 2008
Sorting pesticides	- Pesticides decree 2005, no 21, article 2-5
Limitations packaging material	- Pesticide decree 2005, no 21, article 10,18 - Pesticide order 2008, article 5
Personnel	- Pesticide decree 2005, no 21, article 12,14,17,18
Storage of pesticides	- Pesticide decree 2005, no 21 article 15, 19, 20,21,22
Sampling of pesticides	- Pesticide decree 2005, no 21, article 22-26
Sale of pesticides	- Draft has past the council of ministries

C. Execution of Plant Health Subcomponent

The project will be owned by the Government of Suriname. A Project Manager will be appointed to facilitate implementation of all aspects of the project.

A Project Steering Committee (PSC) may be created from among primary stakeholders to work closely with the Project Manager to ensure that the activities of the project remain focused and implemented in a timely manner. The PSC will work closely with the Project Manager to address issues that may arise during implementation.

Implementation of the technical activities, because of their highly technical nature and in view of the low technical capacity in the Plant Health Service, will require direct inputs, guidance and oversight from a qualified international consultant for about 6 weeks to 2 months per year for the first 3 years (Table 10). National consultants will also be engaged to function as outlined in the scheduling of consultants for specific roles and periods of time. These national consultants will work closely with the international consultant to ensure technical integrity of, and timely inputs to the phytosanitary sub programme.

Several activities of the subcomponent will run concurrently and be scheduled in yearly plans so that the targets are realized as scheduled.

Human resources development may be particularly challenging and scheduling overseas training should be pursued in a way that minimizes negative impacts on the operations of the specific units, so that as far as possible, course work for MSc training may require three semesters abroad and practical field work be relevant to the Department's mission and be done in country.

Knowledge sharing will take place at several levels, with national consultants benefitting from working with international consultants, national and international consultants involve in training staff at various levels of competencies, staff from partner institutions such as Agricultural university and relevant research institutions will be trained so that partnership agreements for pest risk analysis, diagnoses, surveillance, training of NPPO staff are driven by an approval process which ensures technical integrity of their inputs which may be needed during the capacity development phase of the NPPO.

D. Results

Table 8: Abbreviated Results Matrix:

Outcomes	Baseline 2017	End of Project 2022
1. Laboratory established and functional	0	1
2. Human Resources Developed (No of persons trained)	19	74
3. Import regulatory system strengthened	0 (PRAs)	12
4. SPS control established at all official borders and check points	0	6
5. Surveillance System institutionalized and operating (No of crops surveyed)	2	16
Export certification strengthened: (No. of rejections)	24 (rejections)	5
ALPP Established	0	1
Pesticides Management Efficiency	10%	90%

Table 9: Detailed Results Matrix

Detailed Results Matrix							
Outcomes	**Baseline**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Verification**
Outcome 1: Diagnostic Laboratory equipped and functional	28% (PVS)					90%	PCE/PVS results
Equipment		30% equipped	70% equipped	90% equipped	100% equipped	100% equipped	procurement records
Trained personnel	0		2 (Technicians)	1 (Lab manager)	0	3 Total	Training records
Increase in Samples diagnosed/tested per week	0	40	85	125	130	140 total	laboratory records
Documented procedures	0	0	0	0	3	5	Procedures in lab information system
Outcome 2: Import Regulation Strengthened	27% (PVS)					90%	PCE/PVS results
Indicator 1: commodity import requirements developed	0	0	4	2	6	12 (total)	import requirements published/ NPPO Database
Indicator 2: Commodities with regulated pest lists	0	0	4	4	4	12 total: all regulated pest lists updated based on surveillance data	regulated pest lists in database
Indicator 3 PRAs Done	0	0 (PRA Team trained and established)	4	6	12	12 (finalized) 6 pest threats identified and emergency response protocols developed	NPPO information system
Indicator 4: Operational manuals	1	0	0	3	4	8 (total)	NPPO information system
Outcome 3: Border controls Established	4 plans prepared	Facilities and procedures finalized for all ports	**2 (airports)**	1 seaport	2 borders and 2 internal checkpoints	SPS procedures established and fully integrated at all borders information network completed	interceptions records operational border facilities Information system, NPPO records PVS/PCE results
Outcome 4: Strengthened Export Certification System	27% (PVS)					85%	
Indicator 1: Rejections /year	24		20	18	10	7	NPPO notifications and rejection records
Indicator 2: Pest-specific detection protocols developed	0	id of target pests	4	2	2	*2 total 10*	written procedures in NPPO information system
Indicator 3: inspectors trained in pest detection			10	10	10	10 (40 total)	Records and reports of training
Outcome 5: Surveillance System institutionalized	28% (PVS)					85%	PVS/PCE

Indicator1: General surveillance (GS) Specific Surveillance (SS)		2 crops Targets (SS) identified	2 crops 1	2 crops 2	2 crops 2	2 crops (total10) crops 1 crop (Total 6)	surveillance database
Surveillance Protocols developed	0	2	3	3	4	4 (total 16)	NPPO info system
Outcome 6: Human Resources Development (Technical and managerial)	25% (PVS)					90%	PVS/PCE budget allocations SPS personnel at the borders training reports
Indicator 1: MSc. Trained	0	Training plan finalized	1	1	2	1 (total 5)	staff development records
Indicator 2: Management trained			1	0	0	0	training records, reports
Indicator 3: Locally trained	0	30 (SPS Senior staff)	25 (SPS inspectors)				training records, reports
Indicator 4: Public awareness training				1 (public sector awareness)	2 (private sector awareness)		training records, reports
Indicator 5: Occupational health and safety training			40 lab personnel and inspectors				Training records
Outcome 7: ALPP Established	area identified and characterized	procurement and determination of measures	training in fruit fly surveillance implementation of measures	implementation of phytosanitary measures to defined area	implementation of measures to defined area	Verification procedures	Surveillance data
Indicator 1 CFF Catches per trap	1.63	0.03	0.01	0.01	0.01	1 declared ALPP	Surveillance records and Consultant's reports
Indicator 2: SFF Catches per trap	0.07	0.04	0.01	0.01	0.01		
Indicator 3: Protocols/Manuals	0	3	2	0	0	0	
Indicator 4: Trained personnel			5	0	0	0	
Outcome 8: Pesticides Management System established	single person operation	PCB and Pesticides registration system established	Training distributors applicators	Training distributors applicators and users monitoring and enforcement	Training distributors applicators and users, monitoring and enforcement	Training distributors applicators and users monitoring and enforcement	Records and reports, subsidiary legislation setting up the Pesticides Board
Indicator 1. No. of documented procedures prepared	0	0	3	2	2	1 (total 7)	documented procedures available in SPS data base and in use
Indicator 3: Training activities			4 training sessions (region 1)	4 training sessions (region 2)	4 training sessions (region 3)	4 training sessions (region 4) Total per year	Training records/reports

Table 10: Consultants' Schedule**

Schedule of Consultants						
PROGRSAMME	Consultant type	Year 1	Year 2	Year 3	Year 4	Year 5
Import Regulation	1 International (plant) 1 national (animal) 1 national (food 1 national (plant)	3 weeks each $17,250 4,500 4,500 4,500 Training in SPS International standards *(6 weeks*)				
	1 International consultant (plant)	3 weeks 17,250 *PRA theory and practice*	4 weeks 21,000 regulated pest list and import requirements, manuals preparation	4 weeks 21,000 pest list and import requirements manuals preparation	2 weeks 10,500 pest list and import requirements	
	1 International Consultant 1 national consultant		2 weeks 10,500 4 weeks 5,600 develop training materials and curriculum for inspectors; training SPS inspectors			
Export certification	**1 international** **1 national consultant**		2 weeks 10,500 4 weeks 5,600 preparing protocols and training inspectors in export certification procedures	2 weeks 10,500 4 weeks 5,600 preparing protocols and training inspectors in export certification procedures	4 weeks 5,600 preparing protocols and training inspectors in export certification procedures	5,600 2 weeks preparing protocols and training inspectors in export certification procedures
Pest Surveillance	**1 national consultant**	6 weeks **protocols** preparation and pest surveillance	6 weeks protocols preparation and pest surveillance	6 weeks protocols preparation and pest surveillance	6 weeks protocols preparation and pest surveillance	6 weeks protocols preparation and pest surveillance
ALPP	**1 National consultant**	8 weeks 11,200 strategy development and planning training staff	6 weeks 8,400 project implementation and coordination	6 weeks 8,400 project implementation and coordination	6 weeks 8,400 coordination of maintenance procedures	6 weeks 8,400 coordination of maintenance procedures
management of plant health component	**1 national consultant**	12 months	12 months	12 months	12 months	12 months
Total		**54,950**	61,600	45,500	24,500	14,000

**Consultants cost already absorbed in each component

E. Budget

The budget for the Plant Health Component is approximately US$2,885 million. The proposed disbursement period is five-years according to the following disbursement schedule: 13%, 33%, 21%, 18.6% and 14.4%, for year 1 through year 5. Unit costs are specified in the detailed allocations for each sub component in appropriate annexes.

Table 11: Plant Health Budget Summary (US$)

Plant Health Sub-Components	Cost (US$)	% of Total
National Consultant for Implementing the Plant Health Component	90,000	3.1
Plant Quarantine Laboratory	300,000	10.4
Ports of Entry and check points for SPS	557,000	19.3
Human Resources Development	284,000	9.8
Surveillance programme	300,000	10.4
import regulation procedures	195,000	6.8
Export certification	200,000	6.9
Rice quality testing	40,000	1.4
SPS Pesticides Management System	264,000	9.2
Phytosanitary Improvement (*fruit flies and other target pests*) (PILOT)	137,000	4.7
manuals, SOPs, guides, videos, books,	228,000	7.9
SPS Information management System (*reported under animal health*)		
Regional and International Liaison	40,000	1.4
Operating Cost (fuel only)	250,000	8.7
Total Estimated cost for Plant Health	2,885,000	100.00

Table 12: Budget detailed over a five-year period

Plant Health Sub-Components	Cost (US$)					Total Cost
Disbursement Period	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	
National Consultant Plant Health Subcomponent Implementation	**18,000**	**18,000**	**18,000**	**18,000**	**18,000**	**90,000**
Diagnostic Laboratory	**30%**	**70%**	**90%**	**10%**	**100%**	**300,000**
Laboratory Equipment	100,000	120,000	60,000	20,000	0	300,000
Points of Entry and check points for SPS						**557,000**
Airports	10,000	170,000	82,200	60,000	12,450	334,650
Seaport		10,000	62,650	20,000	0	92,650
Land borders and check points			10,000	75,000	44,700	129,700
Human Resources Development						**284,000**
Management training –Head of NPPO		15,000				15,000
5 Subject Specialists (MSc.)	20,000	20,000	20,000	20,000	20,000	100,000
30 persons trained in SPS Standards	35,000	0	0	0	0	35,000
25 inspectors trained in SPS border procedures, pest detection (30 days)	0	50,000	0	0	0	50,000
Training in PRA theory and practice	0	18,000	4,000	0	0	22,000
Awareness training	0	0	10,000	10,000		20,000
Laboratory Manager	0	0	15,000	5,000	0	20,000
Laboratory Technicians	0	14,000	0	0	0	14,000
Occupational health and safety training (safe use of equipment) for lab staff and inspectors	0	0	8,000	0	0	8,000
Surveillance programme						**300,000**
Equipment	30,000	10,000	10,000	10,000	8,805	68,805
Priority pest /crop surveillance	15,000	50,000	50,000	50,000	66,195	231,195
Import Regulation						**195,000**
PRAs done, pest lists developed import requirements, manuals,	30,000	40,000	45,000	40,000	40,000	195,000
Export certification						**20O,000**
Farmer/exporter registration and engagement	0	10,000	20,000	20,000	25,000	75,000
Trace back system (documentation, preparation of components for traceback, protocols for traceback)	0	5,000	10,000	10,000	0	25,000
Inspection protocols and inspectors training	0	15,000	15,000	15,000	15,000	60,000
Third party providers (contract for pest data sheets development, pest identification, ….)	0	10,000	10,000	10,000	10,000	40,000
Consultancies		16,100	16100	5600	5,600	
Rice quality testing Equipment	0	40,000	0	0	0	**40,000**
SPS Pesticides Management System						**264,000**

User registration and database development		20,000	20,000	20,000		60,000
Preparation written procedures and guidance documents required		5,000	5,000	0	0	10,000
Training and awareness creation		20,000	20,000	20,000	20,000	80,000
Monitoring, enforcement and associated activities		15,000	15,000	15,000	15,000	60,000
1 vehicle		30,000				30,000
Pesticides management Consultant		6,000	6,000	6,000	6,000	24,000
Phytosanitary Improvement						**137,000**
traps and lures	40,000	30,000	0	0	0	70,000
National Consultant	10,000	10,000	7,000	7,000	7,000	41,000
protocols development and training	8,000	10,000				18,000
transportation		8,000				8,000
manuals, books, videos compendia etc.		50,000	66,000	62,000	50,000	**228,000**
Regional and International Liaison	8,000	8,000	8,000	8,000	8,000	**40,000**
Operational cost (fuel only) for 5 vehicles	50,000	50,000	50,000	50,000	50,000	**250,000**
Total Estimated cost for Plant Health	**339,000**	**837,000**	**646,850**	**571,000**	**412,200**	**2,885,000**

Table 13: Percentage of total plant health Budget per year for 5 years

Plant Health Component	Cost in US$ Over Five Years					
	Year 1	Year 2	Year 3	Year 4	Year 5	Total US$
Amount Disbursed	339,000	837,000	646,850	571,000	412,200	2,885,000
Percentage of Total	11.8	29	22.1	19.8	14.3	100

F. Sustainability: Recommendation regarding the budget and sustainability

Whereas LVV largely offers its services at no cost to its clients, it is highly desirable from a sustainability point of view to charge fees for its services. In many countries, fees are set in the

national phytosanitary legislation and take into account the increase in cost of services over time so that fees are kept realistic and consistent with the services rendered.

For the plant health service, fees should be charged and rationalized on the service rendered. The issuance of phytosanitary certificates, inspections, analyses performed, overtime work, preparation of PRAs, field certification visits are all services that are chargeable. In many cases, the funds are deposited in the Government's treasury, but the intent of the charges should take into account the further development of the Plant Health Service to deliver on its mandate. Hence provisions for a portion of the earn-back revenues should be negotiated for continuous improvement of the Service.

G: Indicative Terms for Consultants to be hired for the Project

a. Fruit Fly Consultant Terms of Reference

Working under the direct supervision of the head of the plant health Service:

Select and delimit the target area for establishing ALPP as well as the surrounding area to which phytosanitary measures should be applied

Define and discuss the measures and their purpose with the concerned stakeholders, identifying their roles and contribution to the effort.

Develop a manual outlining the methodologies for trap placement and densities, servicing traps, data collection, data transport and storage etc.

Manage the entire implementation and operations of the project to ensure that procedures are compliant with the relevant ISPMs

Collaborate with PHS in undertaking periodic reviews to ensure that targets are being achieved and that methodologies are consistent throughout the project

Ensure transparent documentation of the surveillance data as the basis for determining that the ALPP is achieved.

Determine the extent to which ALPP can be applied to other regions of production as a solution to the fruit fly problem in Suriname.

b. International Phytosanitary Consultant

In close collaboration with the Plant Health Service, LVV Directorate, Food Safety agency and veterinary Services:

Assist in the implementation of all phytosanitary components as needed

Prepare training materials for local training components identified in the project

Identify and develop manuals on import regulation, export certification and pest surveillance, each with about four detailed priority documented procedures

Conduct training for senior personnel in ISPMs, pest risk analysis, operationalization and management of the NPPO

Guide the determination and development of a regulated pest list and establishing import requirements

Train senior qualified personnel in surveillance methodologies consistent with ISPMs

Participate in stakeholders' awareness workshops

III. Technical Aspects and Benefits

a. **Technical Feasibility**

The subcomponents to be addressed are well defined, technically feasible and the desired results are achievable. The major risk involves the availability of funds which this project will address. All of the components except for the establishment of the area of low pest prevalence represent activities that have been done routinely in countries that have established an NPPO. Several countries have also been able to implement pest free areas and areas of low pest prevalence following the procedures of the IPPC (ISPMs 6, 8, 9, 10, 22). These standards have been recognized as having the highest impact on international trade, especially in fruits, allowing exports from countries that are otherwise infested with quarantine pests. The pilot project described in this plant health component has characteristics such as the degree of isolation that will certainly facilitate the successful establishment of the ALPP.

b. **Beneficiaries and benefits**

The areas of concern to be addressed have broad implications for the Government in terms of realizing the goals set in its policy. The realization of those goals are very much dependent on a strong functional regulatory institution that would give protection to natural and

cultivated resources, promote food security and facilitate exports through effective product certification. Industry can experience improved services and support for their products through the production and commercialization chain. The rural poor who supply the labour force on plantations or packaging plants may benefit from the success of their employers. The Plant Health Service as well as LVV will improve credibility among its clients who in turn can be a powerful lobby for phytosanitary improvement. Table 14 below relates the subcomponents to the benefits and beneficiaries.

Table 14: Components, Benefits and Beneficiaries

Components, benefits and beneficiaries relationships		
Component	**Benefits**	**Beneficiaries**
Plant Quarantine Laboratory	• **underpins most IPPC activities** • **accurate pest identification leads to appropriate action** • **to enable safe trade, pest diagnosis must be completed quickly and to a high level of confidence**	**Plant Health Service, Industry and the Government, trading partners**
Land Borders and check points for SPS	• **protect natural and cultivated resources** • **prevent additional costs to control introduced pests** • **increased possibility to maintain and expand markets** • **food security enhanced**	**farmers, Government and general population** **producers, workers and rural poor, Government and general population**
Human Resources Development	• **stronger support for Government's policies** • **increased credibility to local clients, stakeholders and trading partners** • **improved quality of outputs** • **improve productivity**	**LVV as an institution, Government** **Industry groups and farmers** **LVV and clients**
Surveillance programme	• **provides data for development of regulated pest list, commodity pest lists, pest status, PRAs, threat identification etc.**	**producers, NPPO, trading partners**
import regulation	• **natural and cultivated resources protected** • **increased farm and national incomes through effective pest control and regulation** • **enhance food security**	**general population** **farmers and rural poor** **general public**

Export certification	• **access and maintain external markets** • **increased credibility among stakeholders**	**industry producers, the Government and rural poor**
Rice quality testing	• **improved quality and quantity of exports** • **increased marketability**	**Government and rice industry**
SPS Pesticides Management System	• **decreased threats to human and animal and environmental health**	**farmers, distributors, consumers and general public**
Phytosanitary Improvement (PILOT)	• **increased marketable yields and quality** • **import substitution enhanced**	**Fruit producers and farm workers**
manuals, SOPs, guides, videos, books,	• **consistency in application of measures** • **quality management** • **operational and technical capability enhanced**	**LVV, importers, exporters**
Regional and International Liaison	• **information sharing and** • **keeping current**	**PHS, LVV, Government and stakeholders**

G. Environmental Considerations

The plant health components being addressed are guided by the related ISPMs of the IPPC. These ISPMs take into consideration environmental issues, recognizing the overlapping mandates of the IPPC and the CBD. Several ISPMs have been revised to include environmental concerns raised by the CBD and there is an ongoing relationship between these conventions through working groups etc.

The project will in fact contribute to environmental health through the perceived reduction in pesticides use in the ALPP, reduction of mandatory fumigation with methyl bromide, risk-based targeted disinfestations and regulated importation, registration, prudent use, disposal and storage of pesticides.

Pest introductions are accompanied by risks which usually increase the burden of pest management and the use of pesticides. An effective import regulatory system is key to pest exclusion and limits the possibilities of new pest introductions.

The Plant Health Laboratory is not seen as an environmental threat since it will not be dealing with pesticides but will be handling largely diagnostics of plant material and pests. Destruction of small consignments that are detained will be disposed of through a small shared incinerator.

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Section IV: Annexes

Annex 1: Production levels of crop production between 2009 and 2014

DESCRIPTION	2009	2010	2011	2012	2013	2014
ANNUAL CROPS:						
Paddy	54.492	53.555	56.930	51.379	58.274	62.211
Maize	10	15	14	11	19	36
Cassava	142	168	146	173	237	255
Other tubers *	60	59	69	125	167	209
Peanuts	23	21	18	26	30	21
Urdi	100	85	80	37	93	139
Other pulses **	22	24	18	20	22	25
Vegetables ***	748	746	718	608	1.021	1.436
Watermelon	80	90	77	63	84	129
TOTAL ANNUAL CROPS	**55.677**	**54.763**	**58.070**	**52.442**	**59.947**	**64.461**
SEMI - PERMANENT CROPS:						
Bananas	1.963	2.081	2.044	2.051	2.173	2.164
Plantains	424	440	417	602	762	781
Pine-Apple	20	20	20	19	20	62
Passion fruit	15	14	15	89	76	67
Pawpaw (papaya)	18	17	13	13	32	41
TOTAL SEMI - PERMANENT CROPS	**2.440**	**2.572**	**2.509**	**2.774**	**3.063**	**3.115**
PERMANENT CROPS:						
Coconut	814	822	570	467	953	1.099
Oranges	1.420	1.414	1.169	1.138	1.235	1.108
Grapefruits	105	113	110	83	84	83
Pummelo	123	120	126	127	127	128
Other citrus ****	254	239	175	141	161	371
Avocado	8	8	5	5	5	11
Mango	91	90	61	54	170	179
Cherry	12	12	20	23	24	24
Other permanent crops *****	162	164	101	117	141	149
TOTAL PERMANENT CROPS	**2.989**	**2.982**	**2.337**	**2.155**	**2.900**	**3.152**
TOTAL AREA GROWING	**61.106**	**60.317**	**62.916**	**57.371**	**65.910**	**70.728**
Total Small+Large scale Farming	**61.106**	**60.317**	**62.916**	**57.371**	**65.910**	**70.728**
Small scale Farming	28.881	30.267	29.614	29.206	31.994	33.022
Large scale Farming	32.225	30.050	33.302	28.165	33.916	37.706

Annex 2a Levels of activity at the official ports of entry

Arrivals by Sea (origin)	**type of cargo**	**comments**
China	varied plant products	only documentary checks done at the port
USA		
USA as transit country for South and Central America	varied plant and plant products	No facilitation at the port for checking consignments
Trinidad and Tobago	variety of fruits and plant products	limited knowledge of target pests and procedure for cargo inspection
Brazil	variety of plant and plant products	
Mexico	mainly Soya beans	Cargo inspected at owners' facilities or storage area
Arrivals by Air		
Amsterdam	cargo –large quantities of flowers	Level of phytosanitary risk very high. Flights throughout the day to past midnight. Needs a shift system for effective enforcement in view of Customs declaration.
Guyana	boxes and bags of variable sizes with plant material	
all Caribbean islands	boxes, hand luggage	
USA	small boxes or bags, hand luggage	
Venezuela	hand luggage	
Trinidad	boxes, bags and hand luggage	
Brazil	small boxes, bags and hand luggage	
French Guyana	small boxes, bags and hand luggage	
Guyana	passenger baggage, small boxes no commercial cargo	
Arrivals by Albina land border		
French Guiana	1 ferry- about 150 people small boats throughout the day	plant material entering the country poses significant risk
Arrivals via Nickerie Land border		
Guyana	2 ferries daily 200 passengers each Cargo-20 containers, bags and boxes constant arrivals by smaller boats along the border	very high risk particularly to rice and other major crops

Annex 2b: Animals and Meat Products Imported in 2015

Imports of live animals 2015			Meat Products imported in 2015		
Species	No.	Origin	Product	Quantity (KG)	Origin
Horses	10	NL/GY/US	Beef	103,234	US/NL/DO/PA
Breeding bulls	28	US	Pork	49,356	US/NL
Breeding cows	2	US	Lamb	6,767	NL/US
Hatching eggs	72,000	US/FR/CZ/NL	Chicken/duck/turkey	22,947,797	BR/US/TT
Rabbits	62	TT/NL	Meat products	39,554	US
			Milk	487,711	NL, FR
			Dairy products	928,402	NL, US
			Milk powder	2,415,199	NL, FR, MY,US
			Cheese	1,000,293	NL, US

Source: Asycuda

Annex 3. Detailed costs for establishing facilities at the seaport, airports and land borders

J.A Pengel Airport	Existing	To be purchased/Installed	Unit price US $	Approx. Cost (US$)
	None	**PHS Inspectors Office and operating area accommodated within current structure** **Quarantine facility**		**50,000** **100,000**
		2 mobile illuminated tables for inspection	300.00	600.00
		4 inspection kits	200.00	800.00
		1 luggage scanner		120,000.00
		1 incinerator	15,000	15,000
		1 refrigerator		1,000.00
		2 holding bins	50.00	100.00
		sampling bags and vials		200.00
		3 office chairs 5 visitors chairs	300.00 200.00	1,900
		1 computer with appropriate software	1,000.00	1,000.00
		1 Printer/scanner/fax integrated	600.00	600.00
		1 First aid kit	100.00	100.00
		10 sets of protective gear (masks, gas detectors, overalls etc	600.00 (per set)	6,000.00
		2 mobile phones/radios	300.00	600.00
		1 official vehicle	25,000	30,000.00

Total Equipment				**177,900**
Nieuwe Haven Seaport				
		Inspectors Office and operation areas to be constructed		**50,000.00**
		5 mobile illuminated inspection tables	300.00	1,500.00
		7 inspection kits	200.00	1,400.00
		1 refrigerator		1,000.00
		3 holding bins	50.00	150.00
		5 office tables and 8 chairs	500.00	3,000.00
		1 computer with software	1,000.00	1,000.00
		printer/fax/scanner integrated	600.00	600.00
		2 first aid kits	100.00	200.00
		5 mobile phones/radios	300.00	1,500.00
		1 official vehicle	30,000	30,000.00
		7 Protective gear (PPE)	300.00	2,100.00
		sampling bags and vials		200.00
Total Equipment				**42,650**

Zorg en Hoop airport	**Existing**	**To be purchased/Installed**	**Unit cost (US $)**	**Approx. Cost (US$)**
	inspection station	**Working unit**	**5,000**	**5,000**
		1 inspection kit	200.00	200.00
		1 holding bin	50.00	50.00
		1 mobile phone/radio	300	300.00
		sampling bags, vials		200.00
		PPE (5 sets)	**200 per set)**	**1,000**
Total Equipment				**1,750.00**
Nickerie land border and Ferry; police command post				
		Current Customs building and facilities will be upgraded		**25,000.00**
		2 mobile illuminated inspection table	300.00	600.00
		2 inspection kits	200.00	400.00
		2 freezers	1,000.00	2,000.00
		2 refrigerator	1,000.00	2,000.00
		2 holding bins	50.00	100.00
		sampling bags, vials		300.00
		2 office tables	500.00	1,000.00

		4 chairs	200.00	800.00
		1 computer and software	1000.00	1,000.00
		1 printer/scanner/fax	600.00	600.00
		2 mobile phones/radios	300.00	600.00
		2 first aid kit	100.00	200.00
		5 sets of PPE (gas detectors, overalls, masks)	300.00	1,500.00
		1 vehicle	30,000.00	30,000.00
Total Equipment				**41,100**
Albina border crossing and Ferry				
		Current building for Customs will be upgraded		**25,000.00**
		2 inspection kits	200.00	400.00
		2 tables	500.00	1,000.00
		4 chairs	200.00	800.00
		1 computer with software	1,000.00	1,000.00
		1 printer/scanner/fax integrated	600.00	600.00
		first aid kit	100.00	100.00
		2 mobile phones/radios	300.00	600.00
		1 Freezer	1,000.00	1,000.00
		1 refrigerator		1,000.00
		2 holding bins	50.00	100.00
		1 mobile illuminated inspection table	300.00	300.00
		1 vehicle	30,000.00	30,000.00
		5 sets of PPE (masks, clothing)	300.00 (per set)	1,500.00
		sampling bags, vials		200.00
Total Equipment				**38,600**

Annex 4a: Surveillance equipment needs

Equipment	Unit cost (US$)	Total cost (US$)
5 GPS unit	300.00	1,500.00
5 Maps	25.00	125.00
2 Mobile phone/ Radio / Sat phone	300.00	600.00
3 sets Diagnostic keys	400.00	1,200.00
2 Digital cameras	600.00	1,200.00
2 Laptops or personal handheld device	600,00	1,200.00
2 Spades	120.00	240.00
2 sets soil sieves for nematodes	500.00	1,000.00
4 sweep nets	200.00	1,000.00
5 pooters / aspirators	75.000	375.00
2 vacuum/suction traps	150.00	300.00
4 mounting boards	50,00	200.00
5 pairs scissors	15.00	75.00
1 plant press	300.00	600.00
2 pruning saws	30.00	60.00
2 water sprayers	100.00	200.00
4 small combination pick, mattock or trowel	40.00	160.00
2 field microscopes	200.00	400.00
4 beating sheets	50.00	200.00
2 hammers	50.00	100.00
2 chisels	35.00	70.00
5 strong knives	25.00	125.00
2 pairs secateurs	70.00	140.00
10 hand lenses	15.00	150.00
3 pairs binoculars	250.00	500.00
5 Survey bag (Backpack type)	75.00	375.00
4 Small plastic buckets	20.00	80.00
4 Iceboxes	25.00	100.00
1 power saw	150.00	150.00
4 Machetes	25.00	100.00
4 surveillance kits (small knives, tweezers whistles,	120.00	480,00
Trap for different target pests		10,000.00
5 Collecting/Killing jars	20.00	100.00
protective gear		1,000.00
2 First aid kits with eyewash	100.00	200.00
1 vehicles	30,000.00	30,000.00
Miscellaneous		500.00
Total		**54,805**

Annex 4b: Surveillance Supplies Required

Surveillance Reagents and Supplies		Estimated cost (US$)
Ethanol (70-90%)	Brightly coloured ribbons	
Calcium chloride chips (desiccant)	Spray paint	
Ethyl acetate	Camel hair brushes	
Ammonium carbonate	Corrugated cardboard	
Permanent pens notebooks	Plastic tubes with snap on caps (assorted sizes)	
Glassine envelopes for delicate specimens	Tape	
Specimen pots	Clear plastic bags *assorted sizes with zip lock or ties	
Glass vials with screw caps assorted sizes	Newspaper	
Para film	Pins for insects	
Culture plates	Pest Lures	
Razor blades		
Scalpels	Surgical gloves (disposable)	
Gloves *gardening type	Absorbent fiber free paper tissue	
Disinfectant wipes	Acid free collectors tags	
Hand towels	Mosquito repellent	
Disposable coveralls with boot covers		
Estimated cost		**10,000.00**

Annex 5: Diagnostic Equipment Required

Laboratory	Existing	Required	Approx. unit Cost (US$)	Total Cost
Laboratory building and equipment, electricity, organizational costs		**300,000**		**300,000.00**
Equipment		1 digital camera		600.00
	1 binocular microscope	3 binocular microscopes with accessories	400.00	1,200.00
		1 stereo microscope with camera mount plus camera and accessories	1,240.00	1,240.00
		1 insect storage cabinet	2,000.00	2,000.00
	1 refrigerator	1 refrigerator	1,500.00	1,500.00
		6packs cover slips and slides	50.00	300.00
	1 oven	-		
		2 pinning boards and kits	160.00	320.00
		entomological pins and forceps		320.00
		2 insect boxes	300.00	600.00
		2 dissecting sets	160.00	320.00

		1 variable speed centrifuge with tubes, caps et	1,300	1,300.00
		1 precision top balance	1,800	1,800.00
		2 mobile phones/radios	300.00	600.00
		5 packs petri dishes variable sizes	50	250.00
		5 packs pipettes-variable sizes	70.00	350.00
		5 packs flasks- variable sizes	75.00	375.00
		5 packs test tubes-variable and test tube rack	80.00	400.00
		1 nematode extraction unit	200.00	200.00
		1 Fenwick can	1,000.00	1,000.00
		1 Baerman funnel	800.00	800.00
		1 Laminar flow chamber	2,000.00	2.000.00
		1 Fume cupboard	1,300	1,300.00
		1 Autoclave	2,000.00	2,000.00
		1 Hot air oven	1,000.00	1000.00
		1 Analytical balance	2,000.00	2,000.00
		Hot plate with magnetic stirrer	200.00	200.00
		Table top centrifuge	2,500.00	2,500.00
		ph meter	40.00	40.00
		blender	200.00	200.00
		Thermometer, Temperature probes	25.00	25.00
		Distilled water unit	3,000.00	3,000.00
		Freezer	800.00	800.00
		4 packs beakers variable sizes	160,00	640.00
		2 packs of 10 wide mouth bottles	150.00	300.00
		1 Trolley, tray, tubular frame	300.00	300.00
		6 respiratory dusk masks	120.00	720.00
		4 packs gloves chemical resistant, disposable	50.00	200.00
		3 packs specimen vials with caps	50.00	150.00
		2 grain samplers	700.00	1,400.00
		3 laboratory stools	40.00	120.00
		1 laboratory desk and 2 chairs	800.00	800.00
		5 Laboratory aprons	60.00	300.00
		4 flashlights	50.00	200.00
		1 first aid kit	200.00	200.00
Laboratory Office		1 filing cabinet	1,000	1,000.00
	1 desk	2 desks with drawers	1,000	2,000.00
		6 chairs	300.00	1,800.00
	1 computer	3 desk top computers, software and accessories	900.00	2,700.00
		1 printer, scanner, fax machine integrated	1200.00	100.00
		Supplies (alcohol, killing agents, staining agents blotting paper, preserving, etc.		5,000.00
		miscellaneous		5,000,00
Total Equipment and Supplies				**47,470**

Annex 6 Human Resources Requirements

Title training	Objective of the training	Target audience	Location	Number	Budget (US$)
Overseas Study					
MSc in crop protection (*Technical Programmes Manager*)	To boost technical and managerial competencies in technical programmes	suitably qualified persons currently employed by the government	UWI	1	**20,000**
MSc in Crop Protection *(Laboratory Manager)*	To develop technical and managerial capabilities for plant health laboratory procedures	suitably qualified persons currently employed by government	UWI	1	**20,000**
BSc/MSc in crop protection (Border Manager)	Improve technical knowledge in plant protection	Suitably qualified persons employed by the Government	national	1	**20,000**
MSc in Entomology (LVV Dept.)	improve technical and applied skills knowledge in the subject	currently employed or suitably recruited personnel	UWI	1	**20,000**
MSc in Plant Pathology (LVV Dept.)	Improve technical and applied skills in plant pathology	Laboratory staff or suitably qualified persons in LVV or in Suriname	UWI	1	**20,000**
MSc in Nematology	improve knowledge and skills in Nematology	Staff of LVV, other local institution	UWI	1	**20,000**
2 laboratory technicians Plant Health laboratory procedures	To learn procedures and acquire skills related to the functions of the PHS laboratory.	PHS or LVV staff (each for two-month attachment with NPPO of Trinidad)	Trinidad/or local	2	**14,000**
Management training Head of PHS	Acquire managerial skills re human resources, financial, organizational, and project management		**UWI or other institution**	1	**15,000**
Local Courses					
Training in SPS Standards and their application	To understand the SPS standards and measures, their application and implementation for 6 weeks	All subject specialists from LVV, PHS staff, University subject specialists and Customs	International SPS Consultant and 3 national consultants (6 weeks)	30	**35,000**
Pest Risk Analysis theory and practice	Train PRA team to conduct pest risk analysis develop regulated pest list, set import requirements	selected staff from PHS, LVV, university	International Phytosanitary Consultant (9 weeks)	10	**22,000**
Manuals and curriculum preparation **Training in SPS procedures (Inspectors)** **Training costs**	to cross train inspectors from plant animal and food safety for more efficient border control (theory and practice)	Inspectors from LVV Departments	1.International Consultant (4 weeks) 3 National Consultants (6 weeks)	25	**20,000** **20,000** 10,000
Awareness trainings	To increase awareness of the importance of biosecurity in the national economy and encourage national support	policy level personnel, stakeholders and border agencies	policy level awareness linked to training in International SPS Standards	25	**20,000**
Occupational Health and Safety training				35	**8,000**
Total Cost					**284,000**