

EVALUATION STUDY ON LINKAGES OF SELECTED PIECES OF LEGISLATION AND
SPHERES OF GOVERNMENT ON PLANT HEALTH SYSTEM IN SOUTH AFRICA

by

Maanda Rambauli

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SUPERVISOR: PROF F N MUDAU

CO-SUPERVISOR: PROF M A ANTWI

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DECLARATION

I **Maanda Rambauli** hereby declare that the dissertation, which I hereby submit for the degree of **Master of Science in Agriculture** at the University of South Africa, is my own work and has not previously been submitted by me for a degree at this or any other institution.

I declare that the dissertation does not contain any written work presented by other persons whether written, pictures, graphs or data or any other information without acknowledging the source.

I declare that where words from a written source have been used, the words have been paraphrased and referenced and where exact words from a source have been used the words have been placed inside quotation marks and referenced.

Student signature: _____ Date: _____

DEDICATION

This research study is dedicated to the “Dzhutshu family”, more importantly my mother Mrs Thikhathali Jerminah Rambauli, my wife Mrs Annah Mabore Rambauli as well as my two little children Ms Thangano Ananda Rambauli and Mr Mukhethwa Rambauli for the love and believing in me.

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LIST OF ABBREVIATIONS, ACRONYMS AND DEFINITIONS

Act 36 of 1947	Fertilizers, Farm Feed, Agricultural Remedies and Stock Remedies Act, 1947
APA	Agricultural Pests Act, 1983 (Act No.36 of 1983)
ARC	Agricultural Research Council
AU	African Union
CABI	Centre for Agriculture and Biosciences International
COMESA	Common Market for Eastern and Southern Africa
DAFF	Department of Agriculture, Forestry and Fisheries
DEA	Department of Environmental Affairs
DFIES	Directorate Food Import and Export Standards
DIS	Directorate Inspection Services
DOA	Department of Agriculture
DPH	Directorate Plant Health
EASAC	European Academies Science Advisory Council
EPPRP	Emergency Plant Pest Response Plan
FAO	Food and Agriculture Organisation
FAW	Fall armyworm
GATT	General Agreement on Tariffs and Trade
GDP	Gross domestic product
GMOA	Genetically Modified Organisms Act, 1997
IAPSC	Inter-African Phytosanitary Council
IPPC	International Plant Protection Convention
ISPMs	International Standards for Phytosanitary Measures
NDP	National Development Plan

NGP	New Growth Path
NEMBA	National Environmental Management Biodiversity Act, 2004
NPC	National Planning commission
NPPOZA	National Plant Protection Organisation
PBRA	Plant Breeders Rights Act, 1976
PDA s	Provincial Departments of Agriculture
PIA	Plant Improvement Act, 1976
PMG	Parliamentary Monitoring Group
PHM	Plant Health Matters
RK	Republic of Kenya
RPPO	Regional Plant Protection Organisation
RSA	Republic of South Africa
SADC	Southern African Development Community
SPS Agreement	Agreement on the Application of Sanitary and Phytosanitary Measures
STDF	Standard and Trade Development Facility
TBT s	Technical Barriers to Trade
USDA	United States Department of Agriculture
WTO	World Trade Organisation
DEFINITIONS	
International Prescripts	Agreement on the Application of Sanitary and Phytosanitary Measures (WTO-SPS Agreement) and the International Plant Protection Convention (IPPC)
National Authority	Department of Agriculture, Forestry and Fisheries (DAFF), and the Department of Environmental Affairs (DEA)
Local Authority	Provincial Departments of Agriculture (PDAs)

Phytosanitary Measures

Any legislation, regulation or official procedures having the purpose to prevent the introduction or spread of quarantine pests, or to limit the economic impact of regulated non-quarantine pests.

Abstract

Plant health system is an important element for the control and management of plant pests to ensure food production and security as well as safe trade. The objectives of this study were to: identify the existing knowledge gaps on current plant health system at the national and provincial level, identify critical areas to be addressed in the current plant health institutional framework and identify the existing limitations and risks on current legislation. A semi-structured questionnaire was used to collect the data. The data was analysed statistically using the one-way frequency and Spearman's Rank correlation coefficients. The study found that the Provincial Departments of Agriculture (PDAs) (below 50%) lack knowledge of plant health system as compared to the national authorities: DAFF and DEA (above 70%). The study also found that there were no formal linkages between the national and provincial authorities. The study further revealed that there is a need for harmonisation of relevant legislation. It can be concluded that there are knowledge gaps on plant health matters between the national authority and the provincial level and that there are no formal linkages within the spheres of government on plant health matters.

Keywords: Plant health system. Plant pests. Legislation. Knowledge. Institutional framework. Formal linkages. National authority. Provincial authority

CHAPTER 1

1.0 INTRODUCTION

1.1 Background

Due to increased movement of plants and plant commodities that may pose plant pest risks on agriculture and biodiversity, an effective plant health system framework is required for the protection of plants and plant products from harmful plant pests and diseases. Movement of people and goods through various ports of entry has increased over the decade worldwide and this has contributed in the introduction and spread of plant pests and diseases (Petter *et al.*, 2008). Aukema *et al.* (2011) confirmed that the introduction of quarantine pests and diseases is due to global trade and have caused huge impact in agriculture and the environment.

Therefore, plant health regulations or phytosanitary regulations are significant within the framework of the plant health system (Republic of South Africa, 2014). The European Academies Science Advisory Council (EASAC) (2014), pointed out some of the significant roles of plant health regulations globally which include sustainable horticultural produce and food security. Plant health regulations refer to official rules to prevent the introduction, establishment and/or spread of quarantine pests or to limit the economic impact of regulated non-quarantine pests (Food and Agriculture Organisation, 2007).

According to Doring *et al.* (2012), the concept of plant health is complex and relevant criteria should be used in order to define such terminology within an acceptable context. However, the Republic of South Africa (RSA) (2014) in its National Plant Health (Phytosanitary) Policy pointed out the differences in terms of perception on the interpretation of the term “plant health” and “phytosanitary”. The term in question may be viewed as activity of protecting plants from diseases by bio-control, cultivation or cultural practices as well as application of pesticides (RSA, 2014).

Within the international context, plant health system consists of various components which include: institutional arrangement, human capacity, administrative ability, legal basis, survey, pest risk analysis, pest detection, pest identification, pest inspection, pest detection, plant health awareness and communication, permits, training, cooperation and movement control of infested plants and plant products (USDA, 2015; Danielsen & Matsiko, 2016).

Danielsen and Matsiko (2016) suggested that a country needs to establish and develop an effective plant health system framework which will result in effective plant health management and rapid response of quarantine pests.

Plant pests and diseases have a huge impact towards food availability and security (Oerke, 2006). The negative impact, economic implications and consequences caused by harmful or regulated pests to the horticultural industry can be huge if left unattended and may affect production, trade, farmers as well as society in general (RSA, 2014). In fact, the Food and Agriculture Organisation (FAO) (2001) also confirmed that the introduction of quarantine pests can have major trade implications amongst the trading partners.

The European Academies' Science Advisory Council (EASAC) (2014) in its policy report reported that the negative impact caused by plant pests and diseases in horticultural produce can affect all categories of farmers worldwide. Oerke (2006) estimated crop loss due to pest damage at 30-40%. It is well documented that during international trade of horticultural produce, the introduction of pests and diseases can cause severe damage to crops, human health and the economy (RSA, 2014; Flood, 2010). This can cost millions of Rands within spheres of government (national, provincial and local government) and farmers at production level. It has been proven that once a quarantine pest becomes established, it is normally difficult to control and eradicate and is sometimes not economically feasible (RSA, 2014).

During the current decade, South Africa has also been faced with challenges with regard to introduction, establishment and spread of regulated pests such as *Bactrocera dorsalis*, *Tuta absoluta* and *Spodoptera frugiperda* (DAFF, 2017a). For

an example *Tuta absoluta* cannot be solely controlled and managed by one entity and using only one method of control and management. This pest needs an effective regulatory action plan to be integrated and implemented (Illakwahhi & Srivastava, 2017).

Furthermore, the recent outbreak of *Spodoptera frugiperda* posed devastating economic consequences in the whole African continent between the years 2016 and 2017 on major staple crops such as production and other grain commodities (Goergen *et al.* 2016; Ratolojanahary, 2017; DAFF, 2017a; Boiwatch 2017; Croplife, 2017).

According to the Centre for Agriculture and Biosciences International (CABI) (2017), proper advisory mechanism, policy and legislative instruments are critical to assist farmers in the control and management of pests, such as the Fall armyworm. It was estimated that maize production losses may range from 8 to 21m tonnes per annum. The Ministry of Agriculture, Forestry and Fisheries: South Africa, pointed out that damage assessment for the FAW was in motion and was only initiated during the writing of this research study (DAFF, 2017a). However, reports confirm that FAW economic impact is huge if left uncontrolled and it is however expected that farmers and government may bear more cost to control and manage since most registered pesticides are expensive (CABI, 2017; DAFF, 2017a).

Taking cognisance of the importance of the plant health regulations to manage and control the FAW, the DAFF developed and gazetted the “control measures relating to fall armyworm” (RSA, 2017). These measures can be implemented effectively through collaborative approach within the spheres of government.

The current study therefore covers the plant health system and the importance of plant health regulatory framework of South Africa in terms of production, food security, domestic and international trade of plants and plant products. The highlights on the problem statement, aim and objectives of the research study and research questions are also addressed.

1.2 Problem statement

The spread and introduction of plant pests and diseases of economic importance have been affecting agriculture and specifically horticulture in terms of food production and security as well as trade. Although there are international prescripts, competent authorities as well as relevant pieces of legislation and polices, the perpetuation of introduction and spread of these pests and diseases remains a critical challenge to the horticultural sector. However, the possible problems may be outlined as follows:

- Lack of cohesion and harmonisation on national legislation
- Lack of formal linkages within the spheres of government
- Lack of relevant competency and knowledge at provincial level
- Limited participation by extension officers or agricultural advisors on relevant phytosanitary fora
- Potential uncontrolled spread of plant pests and diseases within the Republic
- Minimal cooperative approach in combating pests among role-players, especially at the provincial level
- Insufficient resources and limited capacity at all levels, for instance, budget and human resources
- Knowledge gaps within the spheres of government on trade and quarantine pest matters
- Lack of linkages of research findings to the relevant legislative authority.

The Intergraded Food Security Strategy of South Africa suggests that there is a high need for institutional reforms and establishment within all spheres of government to address the challenges facing agriculture (DOA, 2002). Lack of proper institutional arrangements have led to passive or fragmented implementation of existing legislation, strategies and policies which impacts negatively on the agricultural production (DAFF, 2012a).

1.3 Aims of the study

The aim of the study was to investigate the effectiveness of the plant health system within the spheres of government and determine linkages of plant health legislation with other selected relevant legislation.

1.4 Specific objectives of the study

- 1.4.1 To identify the existing knowledge gaps in phytosanitary matters at both the national and provincial levels within the agricultural field.
- 1.4.2 To identify critical areas and gaps to be addressed in the current institutional framework of national and provincial departments of agriculture.
- 1.4.3 To identify the limitations and risks in the existing or current legislation on phytosanitary matters.

1.5 Research questions

- What is the nature of the plant health system in South Africa?
- What are the limitations in the existing institutional arrangements in the plant health system within the spheres of government?
- Do knowledge gaps on plant health matters at provincial level exist?
- Do the fragmentations in the selected pieces of legislation have an impact on production, domestic and international trade on horticultural produce?
- What are the significant roles of phytosanitary regulation in agricultural food production and security, trade and economic growth?
- Do the extension officers or agricultural scientists at provincial level understand the relevant phytosanitary measures to prevent the spread of plant pests and diseases?
- What are the best cooperative or collaborative models within the spheres of government to be applied in assisting farmers in combating pests?
- Are there sufficient resources and capacity within all the spheres of government to control and manage plant pests and diseases?
- What are the existing linkages within the spheres of government and other authorities regarding plant health matters?

1.6 Conclusions

This study provides for an importance of the effectiveness of the plant health system for the prevention, control and management of plant pests and diseases of economic importance. Within the plant health system, it can be concluded that plant health regulations are critical for the prevention of the introduction, establishment and spread of quarantine pests. This chapter also established that pests and diseases may cause huge economic damage to crop production which may ultimately threaten food security and job creation. Plant pests and diseases may cause severe damage if left unattended and this may be difficult to eradicate and control by both the farmers and government. Therefore, plant health legislation and regulations are very crucial. However, regulations alone cannot achieve any meaningful goal, therefore, there is a need to intensify and capacitate the relevant institutions within the country to deal with the control and management of plant pests and diseases.

This chapter also presented the critical elements of the problem statement, aim of the study, objectives of the study and research questions. These should be addressed by the chapters covered in this dissertation. This dissertation is subdivided into five (5) chapters including this Chapter and these are: Chapter 2: Literature review of the study, Chapter 3: Research and methodology, Chapter 4: Results and discussions, Chapter 5: General conclusions and recommendations.

CHAPTER 2

2.0 LITERATURE REVIEW

2.1 Introduction

This chapter covers the international, regional and national obligations governing plant health system. The South African agricultural economic perspective is also covered in this chapter. The concept of the World Trade Organisation, relevant international agreements and convention such as “the World Trade Organisation Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement)” and the “International Plant Protection Convention (IPPC)” are also covered in this chapter. Furthermore, within the national perspective, institutional and national legislative framework relating to plant health is also covered.

Trade negotiation and trade facilitation have been in the historical background of the World Trade Organisation (WTO) multilateral negotiations for decades. In 1947, “*the General Agreement on Tariffs and Trade (GATT)*” was signed. The GATT was established as a multilateral agreement in regulating international trade. In 1948 the GATT negotiations between countries began aiming at possible reduction and removing tariffs. This was comprised of a couple of engagements/rounds. The first round (Tokyo Round) focused solely on non-tariff trade barriers (technical barriers to trade: TBT). This was followed by the “Uruguay Round” in 1986 to 1994 with the purpose to liberalise all trade matters. Subsequent to that, “Agreements in Agriculture” were established and completed in 1994 which resulted in *the World Trade Organisation Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement)* (WTO, 1994; Stoltenberg, 1993; Suppan, 2005; Theyse, 2009; Lukauskas *et al.* 2013; FAO, 2013).

The WTO is the only international organization dealing with the global rules of trade between nations. Its main function is to ensure that trade flows smoothly, predictably and freely within nations (WTO, 1994; FAO, 2013; WTO, 2014).

To date, there are 161 members of the WTO including South Africa. However, there are still other countries like Lesotho willing to be a signatory member to the WTO (WTO, 2015). The membership to the WTO showed the increase over the years and these have been recorded on the WTO booklet on “the guide to the Uruguay Round Agreements” which reflected low numbers in 2014 which were only 160 WTO members (WTO, 2014).

The WTO (1994) and FAO (2013) pointed out specific objectives of the WTO which are: trade move smoothly, fairly and predictable. These can be achieved through:

- Effective administrative trade agreements;
- Establishment of relevant forum for negotiation;
- Handling of disputes which are legally binding for member states;
- Monitoring trade policy;
- Providing technical assistance and appropriate training
- Cooperation with other governments and organisations.

2.2 South African Agriculture: Situational perspective

South African agriculture is commonly known to be comprised of two categories of farmers: subsistence and commercial farmers (Kirsten and van Zyl, 1998). According to the DAFF (2011a & 2012a), smallholder farmers were also identified as part of categories on agricultural production which basically make an addition to the definition of categories of farmers in South Africa. DAFF (2012a) in its national framework for smallholders indicates that the terminologies smallholders and small-scale farmers are sometimes used interchangeably as these provides for the same meaning. This implies that there are three categories of agricultural producers in the country, namely: commercial, subsistence and small-holder farmers (DAFF, 2012b).

The Agricultural sector is widely recognised as a vital sector in addressing the challenges that the country is facing such as job creation, poverty and inequality (National Planning Commission, 2011). This was further demonstrated by its contribution to potential job creation, food security as well as economic growth and development to South Africa (DAFF, 2011a & DAFF, 2015a). The African Union (2013 & 2014) also shared the same sentiment on the critical role which the

agricultural sector contributes in Africa and as a driver for economic transformation. According to the National Planning Commission (2011), the agriculture sector remains a key driver for job creation. However, RSA (2014) reported that government priorities in agriculture can be achieved through appropriate agricultural measures and/or regulations in order to address food production and security as well as economic growth and development.

The South African agricultural sector contributes about 2.8% of the Gross Domestic Products (GDP) and this has declined over the past decade due to a number of challenges facing the sector which include an uneven international trade environment (DAFF, 2015a). Although agriculture contributes a limited percentage to the GDP, the sector is important in providing decent employment and earning foreign currency (Goldblatt, 2010). The decline was evidently shown in the Agricultural Policy Action Plan (APAP) which showed a decline of 3.0% decline since 1993 (DAFF, 2015a). There have been strong back-and-forth performances in the agricultural sector, however the sector has a potential to contribute about 14% GDP (Goldblatt, 2010; AgriSETA, 2010).

The DAFF (2011a) projected a GDP growth of 2.8% in 2010 to 3.8%. However, currently that is not the case as the current GDP is still at 2.8% (DAFF, 2015a; DAFF, 2016/17). The contribution of agriculture to the gross domestic contribution to decent employment is about 5.5% in 2015/16 (Sihlobo & Nel, 2017). In its strategic plan, the DAFF indicated that in order to fully address triple the challenges of inequality, unemployment and poverty in the local economy should grow by at least by 6% (DAFF, 2011a). In other countries such as Kenya, horticulture alone contributes about 33% in GDP and also contributes directly to food security and household incomes (Agriculture and Food Authority, 2017).

The percentage contribution to the total nominal value added to basic prices by the agricultural sector which excludes fisheries and forestry in 2014 was 2,0% (Stats SA, 2014). In the first quarter of the year 2015, the contribution to the nominal GDP of agriculture in South Africa was still at 2% (Stats SA, 2015).

According to the NPC (2011), agriculture is regarded as one of the remaining sector with a strong direct and indirect economic and employment links to the rural communities. Therefore, the abandonment of agriculture is linked to the neglect of rural communities (NPC, 2011). Agriculture used to be the source of employment for unskilled labourers in South Africa (DAFF, 2015a). However, it can still be placed on its original form through the involvement of small-scale famers or smallholders as well as commercial farmers in the agricultural economy through the value chains. Nevertheless, the NDP identified agriculture as an area of potential growth (NPC, 2011). The DAFF (2017c) reported the agricultural growth by about R80 247 million, which is a drastic increase as compared to the previous years.

In spite of the above, domestically, the horticultural sector is performing and contributing extremely well to the economy and this includes the Johannesburg Fresh Produce Market (JFMP) in commodities like potatoes, onions, and cabbages (National Agriculture Marketing Council, 2008). It was reported that the horticultural sector is expanding in terms of production as compared to other agricultural produce sector (NAMAC, 2008, Ramaila *et al.* 2011). AgriSETA (2010) reported that South Africa is within the top exporters of some horticultural produce which was recorded and ranked first in the world and these include avocados and clementines. However, the current records revealed that horticultural production for 2016/17 decreased by 2, 3% from the previous season. This may be due to decreases in the production of citrus fruit and subtropical fruit (DAFF, 2017c).

The National Development Plan (NDP) and the New Growth Path (NGP) together with the *Industry Policy Action Plan* (IPAP3) evidently have shown the contribution and the importance of the agriculture sector (DAFF, 2015a). In 2017, agriculture production such as horticultural production and grain field crops were found to be performing well in terms of contribution to the DGP since the year 1996. There was a notable increase from about 38% in the second quarter of the year 2017 to 44% in the third quarter (Stats SA, 2017).

The value of agricultural production in South Africa was R 148 235 million in 2011, while its contribution to the GDP was approximately R63 billion. The value of exports

increased by 11,4%, from R62 716 million in 2010/11 to R69 881 million in 2011/12, the most important export products and also in terms of volume of production during 2011/12 being citrus fruits (R7 032 million) and grapes (R4 107 million) (DAFF, 2013a). To date, there is an increase on the value of agricultural production in South Africa which was recorded to R273 344 million in 2016/17, and the GDP contribution was reported at R80 247 million in 2016 (DAFF, 2017c).

Given the situational analysis above, these are indications of the significant role and impact of agricultural measures, such as phytosanitary measures and regulations with regard to food production and security as well as international trade. This would tremendously decline should the phytosanitary regulations not appropriately coordinate and not keeping abreast with national and international needs and demands. This requires maintenance of responsible institutions and well-coordinated plant health system (RSA, 2014).

2.3 World Trade Organisation Agreement on the Application of the Sanitary and Phytosanitary Measures: Concept

South Africa became a signatory of the *World Trade Organization Agreement on the Application of Sanitary and Phytosanitary Measures* (WTO-SPS Agreement) in 1995 (RSA, 2014). Amongst various trade agreements, this chapter focusses on those agreements and treaties that are relevant to plant health issues for the control and management of plant pest risks.

The “WTO-SPS Agreement” came into effect on 01 January 1995 and this agreement provides for how various governments departments should apply measures for plant health, food safety and animal health (WTO-SPS Agreement, 1994; WTO, 2010).

South Africa joined the WTO on since 01 January 1995 (WTO, 2015). Members of this agreement have the right to take sanitary and phytosanitary measures necessary for the protection of human, animal or plant life or health, provided that

such measures are not inconsistent with the provisions of the “WTO-SPS Agreement” (WTO, 1995; FAO 2005).

The SPS Agreement identifies three standards-setting organisations which are: *International Plant Protection Convention* (IPPC) for plant health, Codex Alimentarius Commission for food safety and Office International des e'pizooties (OIE) which is now called a the *World Organisation for Animal Health*. These standard setting bodies share the principles and objectives of the SPS-Agreement (WTO, 1995; FAO, 2013).

According to the WTO- SPS-Agreement (1995) there are key SPS provisions that member countries, including South Africa should adapt and adopt and these are:

- Sovereignty
- Harmonisation
- Non-discrimination
- Risk assessment
- Transparency
- Provisional measures
- Equivalence
- Least trade restrictive
- Appropriate level of protection or consistency

2.3.1 International Plant Protection Convention

The “International Plant Protection Convection” (IPPC) is a standard setting body under the WTO-SPS Agreement which sets the “International Standards for Phytosanitary Measures” (ISPMs). The IPPC came into operation in 1951 and the New Revised Text of the IPPC (1997) came into force on 02 October 2005 (IPPC, 1997; FAO, 2005; FAO, 2013; Petter *et al.*, 2008). South Africa became a signatory to the IPPC on 06 December 1951 and ratified on 21 September 1956 (IPPC, 1997; WTO, 2010; Lukauskas *et al.* 2013). Fundamentally, the IPPC focuses more on the cooperation in controlling pests associated with plants and plant products as well as in preventing the introduction and spread of plant pests into endangered areas (IPPC, 1997). The purpose of the IPPC (1997) is to “secure common and effective

action in order to prevent the introduction and spread of pests of plants and plant products” (IPPC, 1997; Petter *et al.*, 2008). The IPPC is governed by the Commission on Phytosanitary Measures (CPM) (IPPC, 1997).

According to *Article I* of the New Revised Text of the IPPC (1997), “Members are required to adopt the legislative, technical and administrative measures of this Convention”. Furthermore, *Article VI* of the IPPC requires that countries such as South Africa to provide for the general provisions relating to the organisational or institutional framework for the establishment of the “national plant protection organisation” (NPPO). Furthermore, it requires that the “member country shall make provision, to the best of its ability, for an official national plant protection organisation to discharge its main phytosanitary responsibilities” (FAO, 1995).

Within the context of “*Article IV of the IPPC*”, South Africa had established the “National Plant Protection of South Africa” (NPPOZA) to discharge its responsibilities in accordance with the provisions of the IPPC (RSA, 2014). Bewley *et al.* (2006) also emphasises the importance of the provisions and principles of the IPPC and further supports that these should be used as a guide in plant health legislation and measures to member states. According to Vapnek & Manzella (2006), plant health legislation is significant in protecting plant natural resources from the introduction, establishment and spread of harmful pest.

2.3.1.1 International Standards for Phytosanitary Measures

As indicated above, the IPPC is a standard setting body which sets and/or develops the *International Standards for Phytosanitary Measures* (ISPMs). It provides international instruments or guidelines for relevant authorities in member countries of the IPPC. These enable the competent NPPOZA to develop phytosanitary measures and regulations which are align to international standards, scientific principles as well as relevant recommendation/s. The ISPMs No.1 provides for “the phytosanitary principles for the protection of plants and the application of the phytosanitary measures in international trade” (FAO: 2006). To date, there are 41 ISPMs, which include reference standards, pest risk analysis standards, concept standards and

specific standards (FAO, 2017). According to the IPPC (1997) the development of other relevant ISPMs is ongoing.

The ISPM No. 1 provides principles which are the key elements of the IPPC. These include basic and operational principles related to rights and obligations of the member countries to the IPPC (FAO, 2006).

The basic principles are as follows:

- Sovereignty
- Necessity
- Managed risk
- Minimal impact
- Transparency
- Harmonisation
- Non-discrimination
- Technical justification
- Cooperation
- Equivalence of phytosanitary measures
- Modification.

2.3.2 Regional Context

South Africa is a member of the *Regional Plant Protection Organisation (RPPO)* which is the *Inter-African Phytosanitary Council (IAPSC)*. The African Union: IAPSC is basically responsible for the entire African region regarding the protection of plants and their products from harmful pests and diseases (Magalhães, 2010). Currently, there are 8 RPPOs (USDA, 2015). The IAPSC was established in 1954 during the Maputo declaration (FAO, 2018). In terms of *Article IX* of the IPPC, “Members should cooperate with one another in establishing the regional plant protection organization” (RPPO). It furthers state that RPPOs shall function as coordinating bodies in plant protection matters as well as in gathering and disseminating information (IPPC, 1997; Chinappen, 2011). RPPOs are intergovernmental organisations with the purpose of preventing the introduction and spread of pests as

well as in promoting economic and social development of member states (USDA, 2015).

The RPPOs serve as a consultative forum in a region and its role is to harmonise phytosanitary measures to facilitate regional and international trade, development of regional standards, advice and assist member countries on technical, administrative and legislative matters. It also ensures that the IPPC principles and obligations are achieved or met (USDA, 2015). There are 8 RPPOs including IAPSC. IAPSC consists of 56 countries (Bloem, 2016). In 2017, the IPPC reported that there are 9 RPPOs and these are:

- Asia and Pacific Plant Protection Commission (APPPC)
- Comunidad Andina (CA)
- Comité de Sanidad Vegetal del Cono Sur (COSAVE)
- European and Mediterranean Plant Protection Organization (EPPO)
- Inter-African Phytosanitary Council (IAPSC)
- Near East Plant Protection Organization (NEPPO)
- North American Plant Protection Organization (NAPPO)
- Organismo Internacional Regional de Sanidad Agropecuaria (OIRSA)
- Pacific Plant Protection Organization (PPPO)

Some of the fundamental objectives of the IAPSC are to harmonise regional phytosanitary legislative framework within the region as well as training of the NPPO staff in various disciplines such as risk assessment and surveillance. Furthermore, the process to capacitate various NPPOs within the African continent on plant health matters is ongoing through the Standard and Trade Development Facility (STDF) (Magalhães, 2010). The AU: IAPSC (2013), in its final report recommended that the establishment of the NPPO structure and legislative review within the region should be adopted by member states to ensure harmonisation for the purpose of strengthening the plant health management systems.

2.3.3 SADC Trade Protocol

There are 8 regional trade agreements (RTAs) established under the African Union, which may influence trade (Osiemo, 2015; Ngobeni & Fagbayibo, 2015). Chiumya (2009) stated that regional trade agreements within African countries are supported by the relevant authority, which is the Regional Economic Communities (REC). Mapuva & Muyengwa-Mapuva (2014), however, pointed out other relevant agreements which are also relevant for the study and these include are:

2.3.3.1 Common Market for Eastern and Southern Africa

The Common Market for Eastern and Southern Africa (COMESA) has 19 member states excluding South Africa (Mapuva & Muyengwa-Mapuva 2014). COMESA is the largest regional economic organization in Africa. Although South Africa is not a signatory to COMESA, SA is a member of the Southern African Customs Union (SACU). Members of SACU include Botswana, Lesotho, Namibia, South Africa, and Swaziland (Chiumya, 2009).

On July 16, 2008, the United States and SACU signed a Trade, Investment, and Development Cooperative Agreement (TIDCA). SACU was established in 1910; however, it is confirmed to be the oldest customs origination. In 1994, SA initiated re-negotiations with SACU and negotiations were concluded in 2002. The new SACU Agreement entered into force in 2004.

2.3.3.2 Southern African Development Community

According to Takirambudde (1999), the *Southern African Development Community* (SADC) came into effect in 1980 and the name was adopted “from the Southern African Development Coordination Conference (SADCC) to “SADC” in 1992. According to Mandrup (2009), South Africa became a signatory to the SADC in 1994.

SADC has 15 signatory’ member states that operate within the parameters of the agreement including South Africa (Gwala, 2015). As indicated, South Africa became

a member of SADC in 1994. However, Osiemo (2015) pointed out that the implementation and enforcement system of some RTAs such as COMESA and SADC legislative framework are not compulsory to member states.

In 2013, the Cabinet of South Africa ratified the “SPS Annex III to the SADC Protocol on Trade” (GCIS, 2013). According to *Article 16* of the SADC Protocol on Trade Member states shall adopt regulations to facilitate the implementation of Annex III (SADC, 2014).

The institutional arrangement within the SADC region on SPS issues for regional integration and cooperation is well structured as most of SADC member states are also signatories to the SPS agreement (GCIS, 2013). Article 5 of the SADC Protocol on Trade requires that member states such as South Africa should “affirm their existing rights and obligations under the WTO-SPS Agreement (SADC, 2008; SADC, 2014).

2.3.4 National Plant Protection Organisation

The *National Plant Protection Organisation of South Africa* (NPPOZA) has been established within the context of the IPPC and comprised of the following components: (i) Plant Health which is responsible for policy issues, (ii) Inspection Services for operational and enforcement and, (iii) Food Import and Export Standards responsible for awareness and promotion (Figure 2.1) (RSA, 2014).

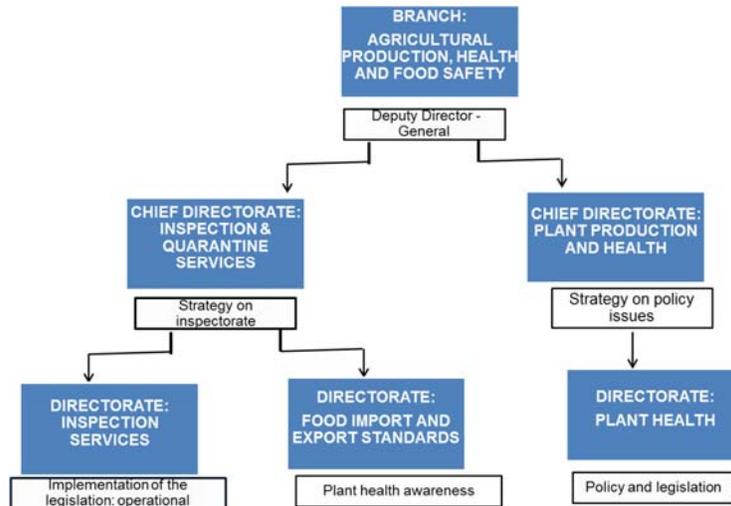


Figure 2.1: Summary of the current structure of the NPPOZA

Article VI of the IPPC provides for the general provisions relating to the organisational arrangements or framework for each contracting party to establish the national plant protection organisation (NPPO). It requires that each member country should make provisions, to the best of its ability, for an official national plant protection organisation to discharge its main phytosanitary responsibilities (IPPC,1997). South Africa as a member has adopted these principles/responsibilities, and embodied them into relevant national policy prescripts (RSA, 2014). The main plant health responsibilities for the official national plant protection organisation are discussed below (IPPC, 1997; FAO, 2013,):

- Issuance of certificates relating to the phytosanitary regulations of the importing contracting party
- Conducting plants pests surveillance
- Reporting on the occurrence, outbreak and spread of plants pests; International obligation
- Inspection of consignments of plants and plant products with the objective to prevent the introduction and spread of plant pests and diseases (import and export: during international trade)
- Disinfestation or disinfection of consignments of plants, plant products and other regulated articles moving in international trade
- Protection of endangered areas

- Designation, maintenance and surveillance of pest free areas and areas of low pests prevalence
- Conduct pest risk analysis
- Maintain phytosanitary security of consignments after certification prior to export
- Conduct training and development of staff.

It further states that each contracting party should make provision, to the best of its ability for:

- Distribution of phytosanitary information within the territory regarding regulated pests and on how they should be prevented and controlled
- Conducting research and investigation in the field of plant protection
- Developing and issuing phytosanitary regulations
- Any other functions (operational, technical and administrative) for the implementation of this convention (IPPC, 1997).

To fulfil the above functions, the NPPO should have legal or regulatory authority, administrative, and functional capacity on scientific, technical, analytical and operational capacities (USDA, 2015). Within the SADC, most countries are members of the WTO SPS agreement and the IPPC; therefore, they do have similar NPPO establishment structures and the National Plant Protection Contact Point, for example South Africa NPPO (Cassidy, 2010). According to SADC (2014) this paves the way for an effective implementation of the SADC SPS annex. Within the SADC region comparisons were done to determine if all SADC member state are affiliated to the IPPC and during the drafting of this paper, it was established that some SADC countries are members of the IPPC and have established NPPOs in accordance with article IV of the IPPC. These countries include: South Africa, Botswana, Zambia, Zimbabwe, Mozambique, Angola, Democratic Republic of Congo, Madagascar, Malawi, Mauritius, Namibia, Seychelles, Swaziland (SADC, 2017 and FAO, 2017).

Contracting parties do not require phytosanitary measures for non-regulated pests (IPPC, 1997). To date, there are 182 contracting parties to the IPPC globally including South Africa, although there are many countries making efforts to be signatories to the IPPC (USDA, 2015; Jarrad *et al.* 2015).

2.3.5 Plant health Institutional arrangements

In South Africa, the competency on phytosanitary matters is within DAFF, national department: National Plant Protection Organisation of South Africa (NPPOZA), Directorates of Plant Health (DPH) and Inspection Services (DIS) as well as Food Import and Export Standards (DFIES). The provision of which is an obligation in terms of *Article IV* of the IPPC which provides for South Africa's signatory membership of the IPPC (RSA, 2014).

According to the RSA (2014) and Chinappen (2011) each government should play an important role in protecting plant health status of its territory in order to ensure safe and fair trade. Chinappen (2011) and RSA (2014) indicate the importance of government departments to apply an inclusive approach with all relevant stakeholders to ensure effective systems in preventing the introduction and spread of "quarantine pests".

Ogden (2012) suggested that effective linkages amongst organs of state and various role-players is a key factor for the effective management of plant pests for export programmes. Furthermore, Shaun (2017) indicated that linkages within the framework of the plant health system is critical for agricultural sustainability, which includes the linkages with various stakeholders, agricultural advisory services, regulatory and policy framework authorities as well as research components.

The African Union (2013b) expressed concerns that agricultural institutions and policies have been ineffective over the past decade due to various factors. These include inappropriate investments and limited assistance by government, the international community as well as private sectors. One of the challenges is that most farmers do not have financial or required resources for controlling and management of plant pests. The AgriSETA (2010) identified other factors impacting agricultural productivity, which include skills demand, relevant legislation as well as international trade and agreements.

2.3.6 National plant health regulatory framework of South Africa

In South Africa, the legislative mandate of the Department of Agriculture, Forestry and Fisheries (DAFF) on the control and management of plant quarantine pests and diseases is the Agricultural Pests Act (APA), 1983 (Act No.36 of 1983) and its associated regulations (RSA, 1983; DAFF, 2015b). This mandate is within the national competency and performed by the NPPOZA which is the requirement in terms of South Africa's membership to the IPPC. The purpose of the APA with regard to phytosanitary matters is to provide for measures by which quarantine pests of plants, plant products and associated regulated articles may be prevented from entering, establishing and spreading in South Africa. The powers and functions to execute the provisions of the APA are vested on the relevant executive officers in terms of the APA (RSA, 1983).

The functional areas concurrent in plant health or phytosanitary matters remains with the DAFF, a national department. These include policy formulation, implementation and institutional arrangements (DAFF, 2015b). According to AU (2013), most of the plant health legislative framework is outdated and there is a need for a comprehensive review. During the drafting of this dissertation, South Africa was still in the process of legislative reform of plant health matters (RSA, 2014; RSA, 2016). In most African countries, the NPPO functions are not mandated to the provincial government although some functions are outsourced from the private sector (AU, 2013b).

The South African plant health legislative framework is being or was revised in accordance with the international standards, principles and obligations of the WTO-SPS as well as the IPPC (RSA, 2014; RSA, 2016). The Plant Protection Act of 2009 in Botswana which provides for the establishment of the National Plant Protection Organisation adopted the same approach of its legislative framework within the WTO-SPS and IPPC context (Government of Botswana, 2009).

In terms of the Constitution of the Republic of South Africa (1996), South Africa has three spheres of government, namely: National, Provincial and Local Government (RSA, 1996). Within the context of agriculture, most of the legislative mandates on

agriculture are vested within the national department. Furthermore, in terms of schedule 4 of the Constitution, agriculture and trade matters are found to have concurrent functional areas within the national and provincial sphere. Although this is not specific on plant pests and disease control of economic importance, it covers animal disease control. After the abolition of apartheid, the government was restructured and remains with nine provinces to date (RSA, 1996). However, in the workshop conducted in 2016 by the USDA in RSA, Pretoria, it was established that these 9 provinces can play a vital role to assist on phytosanitary matters such as awareness and surveillance (Jele & Nxele, 2016).

With reference to the Bill of Rights of the Constitution, agriculture remains a constitutional mandate with concurrent functional areas in various spheres of government (DAFF, 2015b).

According to section 27 of the Constitution of the Republic of South Africa, (1996) “*everyone has the right to have access to sufficient food...and the state must take reasonable legislative and other measures, within its available resources, to achieve the progressive realisation of each of these rights*”. The legislative mandate of the agricultural sector is emanates from section 27(1) (b) of the Constitution (RSA, 1996; DAFF, 2011a).

In South Africa, there is APA with its subordinate legislation which are published in terms of enabling sections with the purpose to provide for prevention of introduction and spread of pests of plants and plant products such as Regulations R.111 of 27 January 1984 (R.111); Government Notice of 26 May 1989 (R.1013) and R.110 of 27 January 1984 (R.110) (DAFF 2015b).

2.3.6.1 Key sections of the Agricultural Pests Act, 1983 (Act No.36 of 1983) (APA)

The Agricultural Pests Act provides for some key sections and associated regulations in relation to international and domestic trade. These include:

(a) Importation of controlled goods

Section 3(1): importation of the controlled goods into the Republic of South Africa states that “no person shall import into the Republic of South Africa-

- Any plant, pathogen, insect, exotic animal, growth medium, infections thing, honey, beeswax or used apiary equipment;
- Anything determined by the Minister by notice in the Gazette, except on the authority of a permit”.
- Subsection 3(2): states that “a person importing controlled goods into the Republic on the authority of permit- shall do so through a prescribed port of entry, except where an executive officer has determined some other place” (RSA, 1983).
- Regulations R.111 which provide for application for the importation of controlled goods (RSA, 1983).
- Importation of controlled goods under this Act is subject to Pest Risk Analysis which is done by the DAFF, Directorate Plant Health.

(b) Prescribing of control measures by the Minister

Section 6 of the APA deals with the prescribing of control measures by the Minister with the purpose to prevent and combat the spreading of pathogens, red-billed quelea, insects and exotic animals. This section states that the Minister may by notice in the *Gazette* prescribe control measures which shall be complied with or carried out by a user of land. Control measures may relate to the following:

- the destruction of plants
- the cleansing or destruction of plants or any particular thing infected with pathogens or insects
- the combating of pathogens, red-billed quelea, insects or exotic animals;
- the keeping, planting or cultivation of plants
- the keeping of pathogens, insects, exotic animals or any particular thing;
- the removal of plants, pathogens, insects, exotic animals or any particular thing-
 - from any land within a specified area to any other land within the same area;

- from any land within a specified area to any land within any other specified area.
- A control measure may:
 - contain a prohibition or obligation with regard to any matter referred to in this Act
 - provide that an executive officer may exempt any person from such a prohibition or obligation by means of a permit;

The above provisions were enacted by means of publication of various national control measures within the Republic of South Africa (RSA) which include Control Measures R.110 of 27 January 1984. Control Measures provide for:

- Prohibition relating to the occurrence and removal of pathogens and insects
- Prohibition relating to movement, keeping, planting or cultivation of certain plants
- Prohibition relating to removal of certain plants
- Exemption from a prohibition
- Prohibition relating to keeping, planting or cultivation of controlled goods.

The APA predates the IPPC and WTO-SPS Agreement; however, the review process was undertaken and was still ongoing during the drafting of this dissertation to ensure alignment with the international obligations and treaties (RSA, 2014). In support of this review process, the Plant Health (Phytosanitary) Policy of South Africa 2014 was developed.

2.3.6.2 *Relevant legislation to the plant health legislation*

According to the RSA (2014), the following relevant legislation are selected based on the cross-cutting issues relating to the administration and implementation of phytosanitary measures:

(a) Plant Improvement Act, 1976 (Act No. 53 of 1976) (PIA)

The purpose of this Act is to provide for the registration of premises from which the sale of certain plants, or the cleansing, packing and sale of certain propagating

material may be undertaken. It prescribes the conditions subject to which such plants or propagating material may be sold for purposes of cultivation, and provides for the recognition of certain varieties of plants, for a system of certification of plants and propagating material to maintain the quality of certain plants and propagating material. It also provides for control of import and export of certain plants and propagating material. It enhances and promotes the quality of plant propagation material available in terms of trade. This is achieved through various programs which include provisions for the establishment and maintenance of official certification schemes for those plant types declared in terms of this Act (RSA, 1976).

Section 26 of the PIA (1976) provides for the importation of plants and propagation material which states that- (1) no person shall import into the Republic any plant or propagation material- (a) unless the plant or propagation material is:

- of a variety of which the denomination is entered in the varietal list
- complies with the requirements prescribed by regulations under this Act
- Imported through a prescribed port of entry or such other place as the registrar may determine.

This Act also provides for certified plant material and ensures the availability of healthy plant material that complies with minimum quality standards, thus promoting and supporting high yields which in turn support the national food security program. The powers under this Act are vested under the Registrar whereas the APA is in terms of the Executive Officer.

(b) Genetically Modified Organisms Act, 1997 (Act No. 15 of 1997) (GMOA)

This act provides for measures to ensure that all activities involving GMOs (including importation, production, release and distribution) shall be carried out or conducted in a manner that will limit possible harmful consequences with regard to the environment, human and plant health that are associated with such activities. It further provides for the establishment of measures for the evaluation and reduction of possible risk arising from the use of the GMOs as well as prescribing the criteria for risk assessments (RSA, 1997).

This relates to phytosanitary measures in the sense that the Living Modified Organisms (LMOs), specifically where they pose a phytosanitary risk as pests that may have negative impact towards agriculture, horticulture and the environment which will ultimately affect the economy in general (RSA, 2014).

The powers under this Act are vested under the Registrar whereas the APA is in terms of the Executive Officer. The matters on Biosafety in South Africa are dealt with in terms of the GMO Act whereas in other countries such as the Republic of Kenya, it is in terms of the Biosafety Act, 2009.

(c) Plant Breeders' Rights Act, 1976 (Act No. 15 of 1976) (PBRA)

It provides for a system where breeders' rights relating to the varieties of certain kinds of plants may be granted and registered, and for the protection of such rights. There is no direct link between the Agricultural Pests Act, 1983 and this Act, however, plants and seeds in international trade are subject to import permit and compliance in terms of APA shall be adhered to.

(d) National Environmental Management Biodiversity Act, 2004 (Act No.10 of 2004) (NEMBA)

The NEMBA and its regulations provide the regulations and requirements for the introduction of alien species, listed invasive species, and threatened or protected species.

Following the Publication of the NEMBA regulations, the DEA established relevant components to address the matters in relation to alien species and invasive species. However, close collaboration between the DEA and DAFF have been established to address cross cutting matters especially on the importation of plants, plant products and related regulated articles.

The importation of biological control organisms is dealt with by a relevant committee of technical experts, between the DAFF and DEA on approval for the release of such organisms.

(e) Fertilizers, Farm Feed, Agricultural Remedies and Stock Remedies Act, 1947 (Act No. 36 of 1947)

This Act provides for the registration of fertilizers, farm feeds, agricultural remedies, stock remedies, sterilizing plants and pest control operators. It also provides for the regulation for imports, sale, acquisition, disposal or use of fertilizers, farm feeds, agricultural remedies and stock remedies.

Regarding certain phytosanitary action, the APA is dependent on the provisions which are provided for by this Act, such as:

- Registration of agrochemicals and imported biological control agents imported in terms of the Agricultural Pests Act, 1983 and the NEMBA for use as biopesticides;
- Provision of registration on pesticides for the control of outbreaks of regulated pests as well as application of treatment on intercepted import consignments;
- Registration of pesticide operators for the fumigation of wood packaging material used in international trade in accordance with the relevant ISPM.

(f) Intergovernmental Relations Framework Act, 2005 (Act No.13 of 2005)

The Intergovernmental Relations Framework Act of 2005 (IRFA), provides for the establishment of a framework for the national government, provincial governments and local governments to promote and facilitate intergovernmental relations as well as to provide the mechanisms and procedures to facilitate the settlement of intergovernmental disputes.

This is in line with chapter 3 of the Constitution, which provides for Cooperative Governance and intergovernmental relations state that all spheres of government must observe and adhere to the principles in this Chapter and must conduct their activities within the parameters that the Chapter provides. With regard to the principles of this provision, It further states that all spheres of government and all organs of state within each sphere must- co-operate with one another in mutual trust and good faith by assisting and supporting one another, informing one another of,

and consulting one another on matters of common interest, co-ordinating their actions and legislation with one another as well as adhering to agreed procedures.

The above provisions are crucial in dealing with relevant concurrent matters relating to plant health matters between the national and provincial authority.

2.3.7 Plant health system: other countries' perspectives

CABI (2016) conducted a study on the investigation of the effectiveness and the strength of the plant health system as well as the level of knowledge on pests and diseases in various African countries (DRC, Ghana, Kenya, Rwanda, Sierra Leone, Tanzania and Uganda). However, the study was not conducted in South Africa and it is essential to conduct the same investigation in South Africa. The investigation conducted by the CABI in the developing African countries was very specific in the sense that it was dealing with the effectiveness and the strength of the plant health systems focusing at the establishment of plant health clinics. However, this study does not necessarily deal with similar issues as it covers the linkages in relation to related legislation and institutional arrangement as well as knowledge gaps on the plant health environment.

The United States Department of Agriculture (USDA) (2015) suggested that countries should have an effective plant health system to successfully safeguard its territories from the introduction and spread of quarantine pests. It further states that there should be sound and effective institutional instruments, coordinated and cooperative programs which involve communities and local authority (USDA, 2015). In the USA, although there is a national law on plant health such as the Plant Quarantine Act, 2000, there is Federal legislation executed by the states in order to control and manage plant pests and diseases (USDA, 2017). In Australia, the Plant Biosecurity system is effective and it involves provincial or state authority through the “intergovernmental agreement on biosecurity” to ensure affective coordination between the national government and local authority (Turner, 2017). In South Africa, there is the Intergovernmental Relations Act which can also be implemented to ensure a good working relation with provinces (RSA, 2005).

The Republic of Kenya (2010), in its National Horticulture Policy points out some of the challenges affecting horticultural production with regard to legislative, regulatory and institutional framework. These include lack of appropriate policy and institutional framework, respectively, which results in poor enforcement of phytosanitary measures, inadequate human capacity as well as financial resources. One of the challenges facing rural communities is participation in agriculture especially on the contribution to food production and security aspects. This is due to lack of institutional capacity and poor co-ordination within spheres of government (RK, 2010). Serem (2009) conducted a study in Kenya focusing on challenges faced by the small-scale farmers towards horticultural produce and their participation in trade with the aim to boost job creation, economic growth and development. Serem (2009) recommended appropriate measures to encourage inclusive participation to international trade on horticultural produce and these intervention measures include development agencies and governments to promote export oriented horticulture production.

Furthermore, Chinappen (2011), through the STDF prepared a proposal for phytosanitary capacity building strategy in Africa and pointed out some of the significant aspects for effective plant health systems which include awareness, advocacy and resource mobilization. The study further pointed out that many stakeholders underestimate the importance of plant health systems, therefore resources are not allocated adequately. The proposal further states that phytosanitary measures should be made in such a way that they are constantly reviewed, drafted in a manner which is easy to understand and implementable by all stakeholders. Collaboration and support of the community in the rural areas was also found to be crucial in ensuring effective and efficient plant health system (Chinappen, 2011). According to Danielsen and Matsiko (2016), the level of advisory services on plant health matters received by the small-scale farmers seems not to be sufficient in most African or developing countries. Wright *et al.* (2016) suggested that this could be due to lack of enough capacity or resources from the extension services.

2.3.8 Plant health knowledge and perception in society

Flood (2010), conducted a study on society's perceptions towards the significance of phytosanitary measures and found that plant health matters are not obtaining priority as they should, especially on the impact of pests and diseases on crop losses. During the Southern and Eastern Africa Cotton Forum (CABI, 2014) it was noted that plant health matters are usually not prioritized in many countries in Africa, although they are significant on crop productivity in general. The negative impact caused by pests and diseases of economic importance may ultimately cause huge consequences to the farmers (CABI, 2014; RSA, 2014).

According to the RSA (2014), it is important to conduct training and development of staff on plant health matters. Plant health information and knowledge is one of the shortcomings to many small-scale farmers and officials at the local and provincial levels (Cameron *et al.* 2016). In South Africa, one of the responsibilities of the National Plant Protection Organisation is to conduct awareness and promotion on plant health matters (RSA, 2014). However, the impact of this responsibility is not fully known within the spheres of government, which would be investigated by this study. Benard (2011) discovered that small-holder farmers in many African countries do confront challenges in terms of the accessibility to information as well as in obtaining appropriate updated information.

Many authors allude that the threat posed by plant pests and diseases to food security is huge if left unattended (Flood, 2010; FAO, 2001; Bebbler *et al.* 2013). Flood (2010) defined food security as a mechanism wherein all societies have access to sufficient, safe and nutritious food for livelihood through production and trade. The Constitution of the RSA (1996) effected the provisions of fundamental basic rights to address food security challenges under the Bill of Rights of the Constitution of the Republic.

The effectiveness of plant health management is a key factor towards supporting food security, domestic and international trade as reported by a study conducted in Uganda: "a plant health system framework to assess plant health clinic in Uganda" (Danielson & Matsiko, 2016).

02.3.9 Conclusions

The plant health system worldwide is structured in accordance with the international prescripts and national legislation relating to phytosanitary matters. It can be concluded that the relevant international prescripts for plant health are: World Trade Organisation on the Application of Sanitary and Phytosanitary Agreement (WTO-SPS Agreement) and the International Plant Protection Convention (IPPC).

Most of the countries such as South Africa are the signatories to these international obligations. Therefore, South Africa as the signatory body has to comply with the requirements and obligations as stipulated in these international prescripts including the establishment of the National Plant Protection Organisation of South Africa. The literature search found that the competent authority for the control and management of plant pests and diseases of quarantine importance is vested at national level. In this regard, all South African plant health legislation and regulations are based on the international standards of the IPPC, which are usually called “the International Standards for Phytosanitary Measures”.

It can be concluded that the South African relevant legislation on plant health matters is the Agricultural Pests Act, 1983 (Act No.36 of 1983) which is currently being reviewed to ensure alignment with the international and national requirements. It can be further concluded that plant health legislation and regulations are critical for the prevention, control and management of plant pests and diseases to safeguard the country from harmful pests in order to facilitate trade and food production. This will have a significant impact towards job creation and opportunities, economic growth and development as well as agricultural sustainability.

In terms of other relevant legislative framework, it can be concluded that the Agricultural Pests Act, 1983 provides for the import of plants and plant products and national control of pests and disease which affects other legislation such as the National Management Biodiversity Act, 2004.

The materials and methods of this study are discussed in the next Chapter.

CHAPTER 3

3.0 RESEARCH DESIGN AND METHODOLOGY

3.1 Introduction

A study in plant health system of South Africa was carried out in 2016 and 2017. The survey was conducted in South Africa with relevant staff or officials from the National Department of Agriculture, Forestry and Fisheries (DAFF), Department of Environmental Affairs (DEA) as well as the 7 Provincial Departments of Agriculture (PDAs). A questionnaire was developed and the participants or respondents were required to answer the questions relating to the South African plant health system.

These include questions relating to biography, knowledge on plant health system, legislative and regulatory instruments as well as institutional framework on plant health system of South Africa. In some cases where clarify was required, oral presentations were conducted or delivered.

The frequency analysis and Spearman's rank correlation coefficient was used to determine the relationship, strength and the effectiveness of the institutional and legislative framework of South Africa in relation to plant health system.

3.2 Research design

Research data was obtained through a semi-structured questionnaire which was both qualitative and quantitative. The questionnaire was designed to gather information on plant health system relating to biographical information and knowledge on plant health matters as well as linkages on institutional and legislative framework.

3.3 Data sources

The questionnaires for the survey were circulated and distributed directly to the main role-players using various mechanisms such as e-mail, hand delivery as well as face to face interviews.

3.4 Data collection

All participants and respondents were required to forward the completed questionnaires through e-mail or delivered by hand. However, most respondents preferred to e-mail the completed questionnaires. Respondents who were directly interviewed did submit the completed questions by hand. The completed questionnaires were collected as soon as they were completed and this was normally within a day.

Permission to collect data from personnel of DAFF, DEA and PDAs was granted and the individual consents were received. Each participant was informed about the consent related matters before the commencement of interview to ensure that the ethical guidelines of the University of South Africa are adhered to.

Respondents or participants were asked the same question/s at their different locations and responses were confidentially treated to ensure credibility. To ensure compliance with research ethics, questionnaires were discussed with each interviewee prior to the commencement of the interviews.

3.5 Sample techniques

Stratified Random Sampling was used and data was collected from scientists, inspectors, biodiversity officers, agricultural advisors or extension officers at DAFF, DEA and PDAs respectively. The data were collected from a total of 60 respondents at DAFF, DEA and PDAs respectively. Data was collected from 30 respondents from National departments which is subdivided into 15 respondents from DAFF and 15 respondents from DEA, and 30 respondents of the 7 PDAs (from the total of 9 provinces) respectively (Table 3.1). The collected data was deemed to be

representative from the total population of 100 officials on plant health disciplines and related fields.

The questionnaires were directed to officials, who have at least 2 years or more working experience, senior officials within the plant health or related fields (Table 3.2). Representations in terms of sample group were considered because the respondents should have had relevant knowledge and experience in the field of plant health and related disciplines. More importantly, the samples were from those who are functioning within the administration, application, implementation and enforcement of plant health related strategies, plant pests and diseases control, programmes, legislation and policy.

Table 3.1: Institutions and number of people interviewed

No table of figures entries found.	Number interviewed	Who were interviewed
National departments:	30	Scientists, Audit inspectors, Agricultural Registrar of relevant Act, Biodiversity officer,
DAFF	15	
DEA	15	
Provincial Departments of Agriculture (PDAs):	30	Scientists, Agricultural advisors, and extension officers.
<ul style="list-style-type: none"> • Limpopo • Gauteng • North West • Northern Cape • Free State • Eastern Cape • Western Cape 	<ul style="list-style-type: none"> • 5 • 5 • 5 • 5 • 5 • 3 • 2 	
Total of the sample	60 sample	-
Total Population	100	-

Table 3.2: Inclusion and exclusion element of the study

Number	Exclusion	Inclusion
a.	Unexperienced individuals	Selected 7 provinces from the total sample of 9 and other government departments
b.	Fields outside plant health matters and related fields	60 population size within all identified field and institutions
c.	Farmers, producers, importers, exporters, and consumers	Selected international and national legislation and/or prescripts
d.	Unpublished data	Publications: policy and legislative matters
e.	Students and Universities	Relevant reports and scientific publication

3.6 Data analysis

All fully completed questionnaires were coded and captured using the Statistical Package for the Social Science (SPSS. Version 20). The data was analysed statistically using the one-way frequency and Spearman's Rank correlation coefficients with the SPSS computer software.

Spearman's Rank correlation coefficient is normally used to summarise the strength and direction (negative or positive) of a relationship between two variables and the result will always be between 1 and minus 1. The advantage of the method is that it takes into account the number of tied data values which are present in a sample and the way they are treated in calculating the rank correlation. The correlation assesses how well the relationship between two variables can be described using a monotonic function. A perfect Spearman correlation of +1 or -1 occurs when each of the variables is a perfect monotone function of the other. Intuitively, the Spearman correlation between two variables will be high when observations have a similar (or identical for a correlation of 1) rank (i.e. relative position label of the observations within the variable: 1st, 2nd, 3rd etc.) between the two variables, and low when observations have a dissimilar (or fully opposed for a correlation of -1) rank between the two variables. Spearman's coefficient is appropriate for both continuous and discrete ordinal variables.

Mathematically the Spearman Rank's correlation coefficient R is presented as:

$$(R) = 1 - \frac{6 \sum d^2}{n^3 - n}$$

$d_i = \text{rg}(X_i) - \text{rg}(Y_i)$ = the difference between the two ranks of each observation

n=number of observations

3.7 Ethics considerations

All applicable rules and ethics requirements of the University of South Africa (UNISA) were adhered to in ensuring compliance. The letter/s to request for a permission to conduct this study within the specified departments or institutions was circulated to individual departments. Permission from the specified departments or institutions was granted and/or approved.

Subsequently, approved permissions to conduct this study were received from DAFF, DEA and 7 PDAs. All necessary documentation regarding application for ethics were completed and submitted to the UNISA ethics committee for consideration. UNISA's relevant committee evaluated the application and approved the application for ethics and permission was granted to proceed with data collection.

Terms and conditions were discussed with the interviewees prior to commencement of the interviews to ensure adherence and compliance with ethics requirements. Written and/or verbal consent from individuals was obtained prior to commencement of the survey.

3.8 Conclusions

The questionnaires were used and distributed to participants from the DAFF, DEA and PDAs. A total of 60 respondents from the DAFF, DEA and PDA were interviewed. Data was collected from 30 respondents from National departments (DEA and DAFF) and 30 respondents from 7 PDAs (from the total of 9 provinces)

respectively. Frequency analysis and Spearman's rank correlation coefficient was used to determine the relationship, strength and the effectiveness of the institutional and legislative frameworks of South Africa in relation to plant health system.

The materials and methods as indicated above have been covered and elaborated in detail and further supported by the attached appendixes. Based on the materials and methods, data was processed accordingly in order to reflect the findings/results of this study which will be presented and discussed in detail in the next Chapter.

CHAPTER 4

4.0 RESULTS AND DISCUSSIONS

4.1 Introduction

This chapter covers the findings or results of the study, which are simultaneously presented and discussed. Fundamentally, this chapter is subdivided into various sections which include the demographic aspects of the respondents, knowledge and understanding of the respondents regarding plant health matters, institutional arrangements in terms of linkages as well as the framework of the selected pieces of legislation. The results are presented in the form of Tables and Figures.

4.2 Demographics of respondents of the study

The demographics of respondents working at the national levels of: DAFF (NPPOZA) and DEA (Biosecurity) as well as the PDAs are presented in the form of frequencies in Figure 4.1 to Figure 4. 5 and Table 4.1. These include gender, age, home language, education, designation, experience as well as place of employment. There were 60 respondents from both the National and Provincial authorities which are subdivided into: 30 participants from national authorities and 30 participants from 7 (seven) Provincial Departments of Agriculture (PDAs).

4.2.1 Age distribution of the respondents

The age groups of the respondents are presented in Figure 4.1. It was found that all categories of age groups are reflected across all spheres of government. The findings indicated that, most of the respondents from the national authorities are youths aged between 20 and 35 (46.7%) and 35 to 45 (46.7%), whereas at the provincial level, 46.7% of the respondents were between the ages of 46- 55 years. These finding indicate that most of the officials who work at the PDAs are older as

compared to those at the national level. Ngaka & Zwane (2017) found that the majority of the officials at the provincial authority, PDAs are older as compared to those at the national authority in agriculture. The higher percentage of the older officials at the PDAs may be as a result of a low staff turn-over once they are employed. Most youths at the national department are university interns and therefore have minimal work experience.

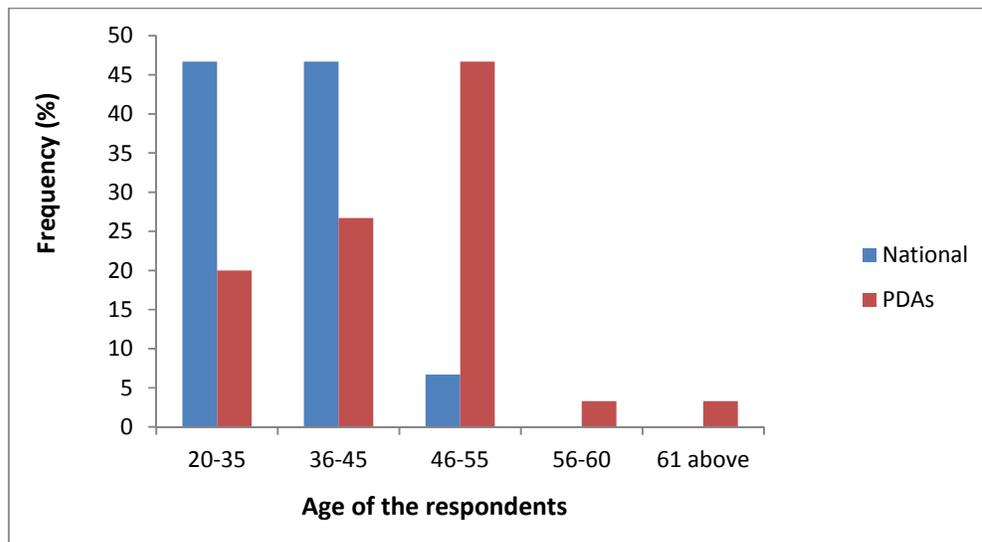


Figure 4. 1: Age distribution of the respondents

4.2.2 Gender of the respondents

According to Figure 4.2, among the respondents interviewed at relevant national department levels there was gender balance (50% male & 50% female), whereas at provincial level 63.4% were male and 33.3% females. In general, many people perceive agriculture as a field that requires more labour force hence male predominated (DAFF, 2017b).

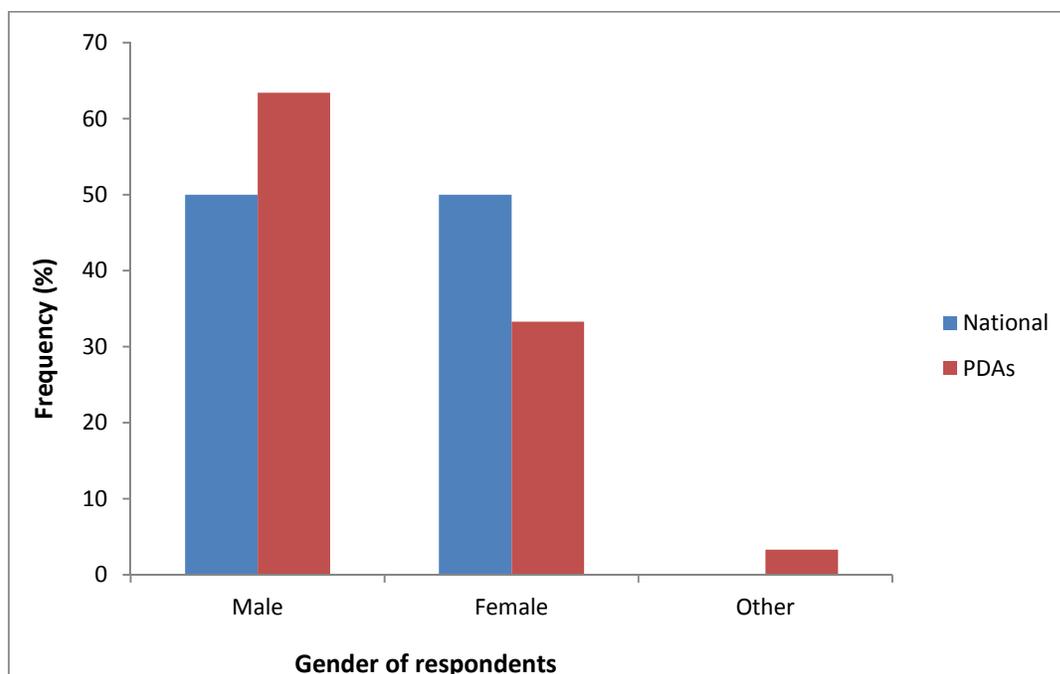


Figure 4. 2: Gender of respondents

*other means foreign nationals.

4.2.3 Ethnic groups of the respondents

In terms of ethnic groups, the results indicate that 9 ethnic groups were interviewed (Table 4.1).

Table 4.1: Ethnic groups of the respondents

H. Language	National (%)	PDAs (%)
English	10.0	3.3
Venda	33.3	43.3
Zulu	10.0	6.7
Tsonga	3.3	6.7
Tswana	6.7	6.7
Xhosa	10.0	6.7
Sotho	-	6.7
Pedi	20.0	6.7
Afrikaans	6.7	23.3
*Other	-	3.3
Total	100	100

*other means foreign nationals.

4.2.4 Designation of the respondents

The results show that most of the participants were scientists (33.3%) at the national level and 96.7 of the respondents at the PDAs were agricultural advisors who are also referred to as scientists in terms of the resolution 3 of 2009 of the DPSA (Figure 4.3). Plant Health is science based and requires academically qualified personnel with scientific background to optimally function. Plant health regulations must be developed in accordance with the scientific principles of the IPPC (RSA, 2014).

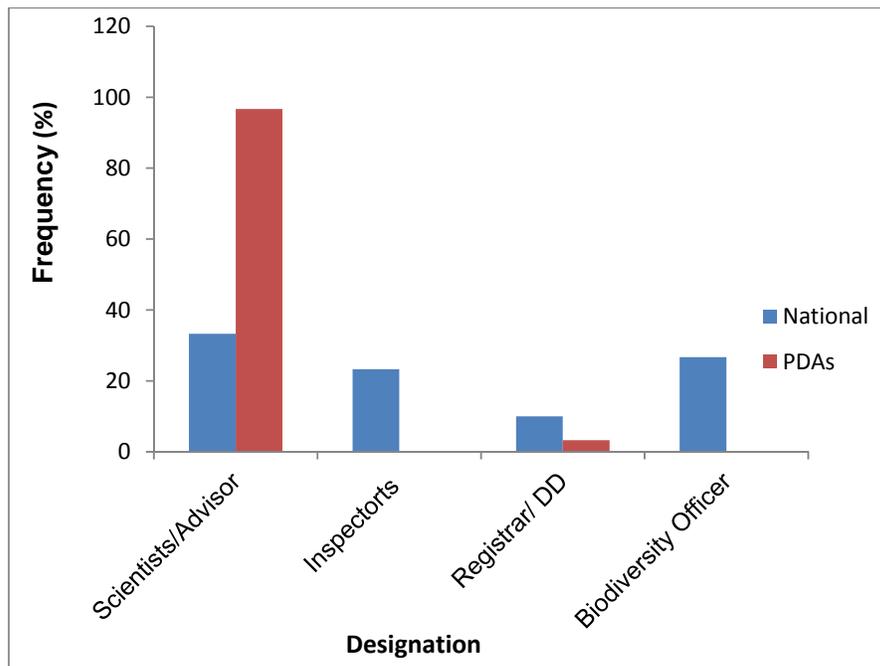


Figure 4. 3 Designation of the respondents on plant health matters

4.2.5 Educational background of the respondents

The results in terms of the educational background showed that the predominantly educational level among the respondents is postgraduate degree at the PDAs (73.3%) as compared to the national departments (53%) (Figure 4.4). This is because most of the respondents working at the PDAs are older and they have already obtained their post graduate degrees. Whereas those at national level are youths and they are busy furthering their studies. According to the Plant Health Policy of South Africa (2014), the relevant qualifications and technical skills required

to operate at the plant health environment include, plant pathology, entomology and nematology.

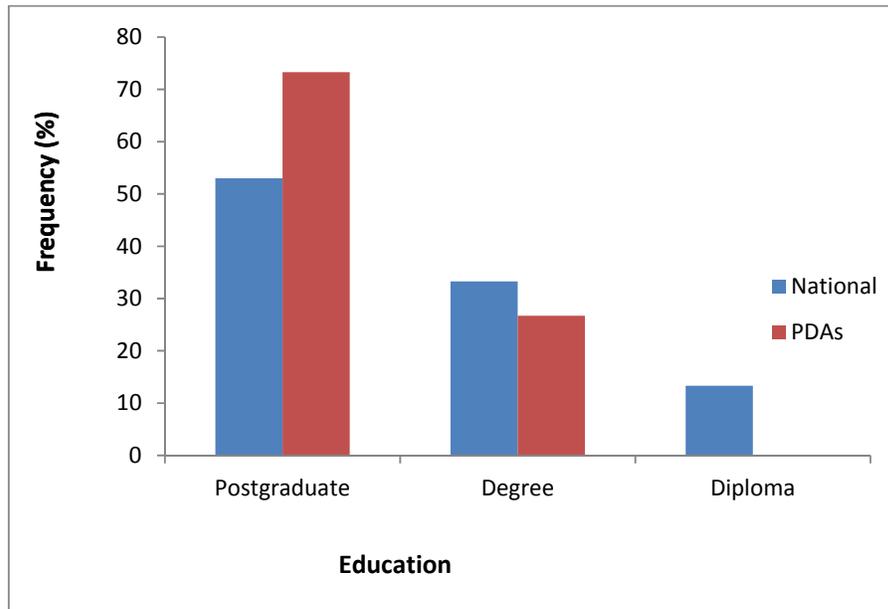


Figure 4. 4: Education background of the respondents

4.2.6 Work experience of the respondents

The results indicate that half of the respondents (50%) with an extensive experience in agriculture are located at the provincial level as compared to respondents (36.7%) at the national departments (Figure 4.5). This is because most of the officials at the provincial level are older and do not change employment therefore it is expected that they will accumulate more years of working experience. Ngaka & Zwane (2017) conducted a study in 9 provinces and found that there were more respondents at the provincial level with more years of working experience.

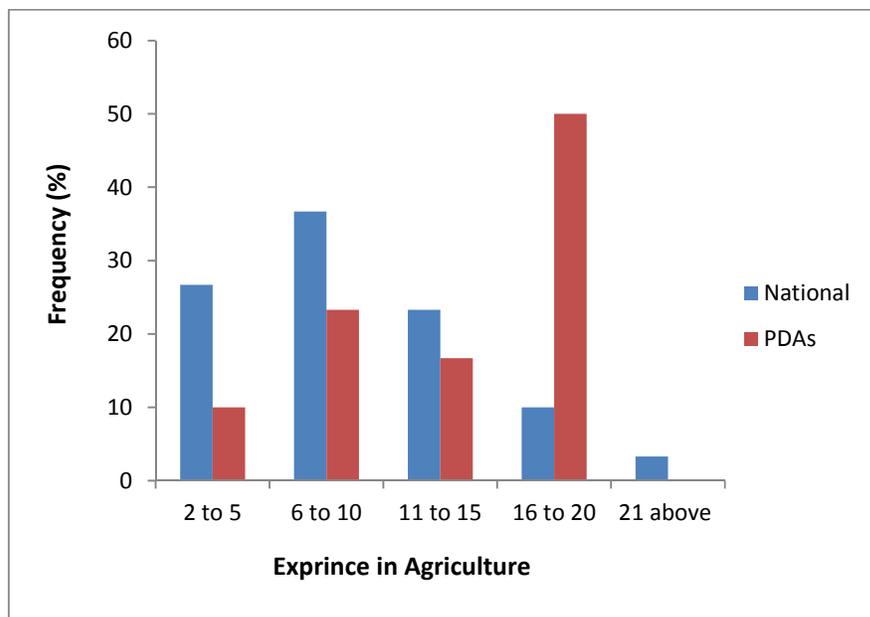


Figure 4. 5: Work experience of the respondents

4.3 Knowledge and understanding of the plant health system

Plant health knowledge and understanding is an integral part of the control and management of plant pests and diseases. The findings of the aspects of knowledge and understanding on plant health matters are presented in Figure 4.6 to Figure 4.10. These include knowledge of plant health system, knowledge on relevant national legislation, knowledge of the international prescripts, knowledge on basic training for quarantine pests and provision of inputs on policy issues.

4.3.1 Level of knowledge and understanding of the plant health system in South Africa

The results in Figure 4.6 revealed that 76.7% of the respondents at national level have more knowledge and understanding on plant health system. However, at the PDAs or provincial level, the findings show that only 36.7% of them have knowledge and understanding of the plant health system (Figure 4.6). Cameron *et al.* (2016), pointed some of the shortcomings related to plant health knowledge which is experienced by some of the agricultural advisors, extension officers as well as all small-scale farmers. Bandara & Kulatunga (2014) reported that extension advisors

should possess relevant knowledge to enable them to advise farmers regarding pests and diseases diagnosis and management. The current study revealed that irrespective of the experience, designation and education, the level of knowledge at the provincial level was found to be low and this may potentially disadvantage farmers at production level within a specific province. According to Flood (2010), plant health issues are essential for food security. Below are the areas of knowledge specified by the respondents especially those from the national authorities:

National respondents

Provincial respondents

- *Structure of the National Plant Protection Organisation of South Africa,*
 - *The Agricultural Pests Act, 1983 (Act No 36 of 1983),*
 - *The Plant Health Policy,*
 - *Phytosanitary regulations and measures,*
 - *SA import requirements for plants and plant products,*
 - *Inspections and surveillance,*
 - *Sampling and testing of plant pests,*
 - *Emergency Plant Pest Response Plan,*
 - *Phytosanitary certificate and import permit,*
 - *Plant health awareness and promotion of plant production in general,*
 - *IPPC and WTO SPS,*
 - *PRA, pre-border weed risk assessment,*
 - *Phytosanitary procedures.*
- *Pest control,*
 - *Application of pesticides,*
 - *Agricultural Pests Act.*

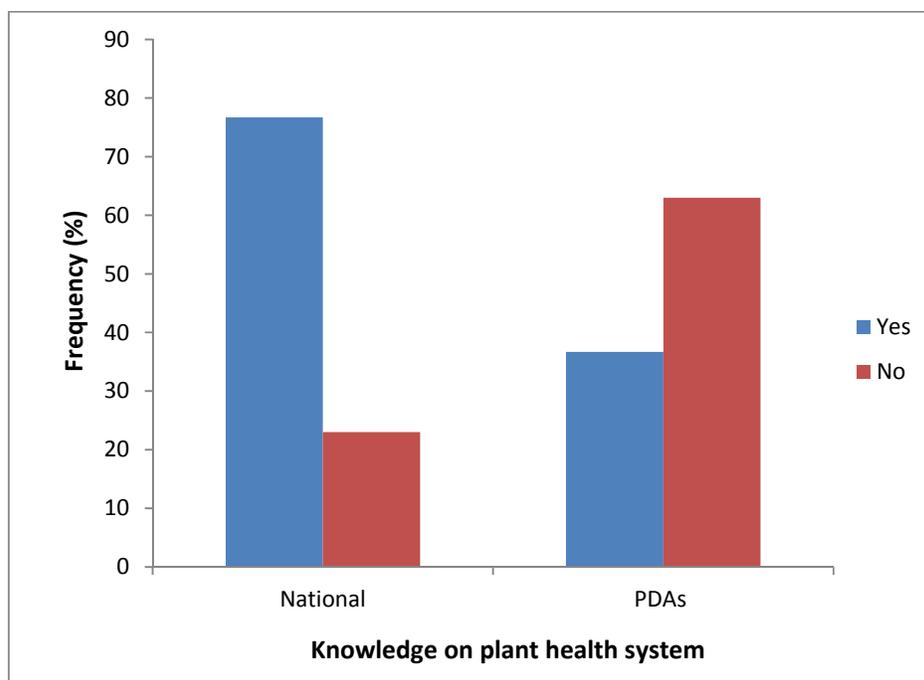


Figure 4. 6: Knowledge of the respondents on plant health matters

4.3.2 Knowledge and understanding of plant health international prescripts

The results show that the majority of respondents (90%) at the national departments and 50% of the respondents at the PDAs have knowledge of the international prescripts (Figure 4.7). The findings from the PDAs revealed that there is a need for intervention to increase the level of such knowledge on plant health. However, this may be as a result of lack of exposure to the PDAs with regard to the concept of the international prescripts such as the IPPC and the WTO-SPS agreement. The results gathered from the PDAs showed some of the shortcomings which is inconsistent with Article IV of the IPPC, 1997 (NRT) which requires that information on “regulated pest” an internationally accepted term should be distributed within the country especially for the contracting party to the IPPC.

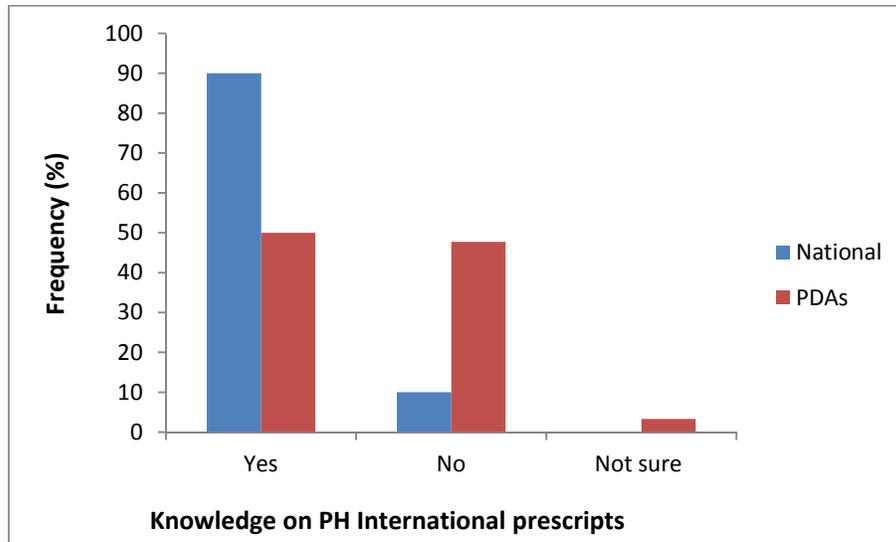


Figure 4. 7: Knowledge of the respondents on plant health international prescripts

4.3.3 Knowledge on plant health national legislation

The results indicate that 93.3% of the respondents at the national department and 56.7% at the provincial level do have knowledge of the selected pieces of national legislation impacting on plant health issues (Figure 4.8). This is because most of the PDAs do not have a mandate on national legislation hence the significant differences as compared to the national authority. The study conducted by Cameron *et al.* (2016) indicated that legislation is significant as this helps farmers to be provided with latest and updated information and/or knowledge. It is crucial that all government officials within the spheres of government should keep abreast with the latest developments to legislation.

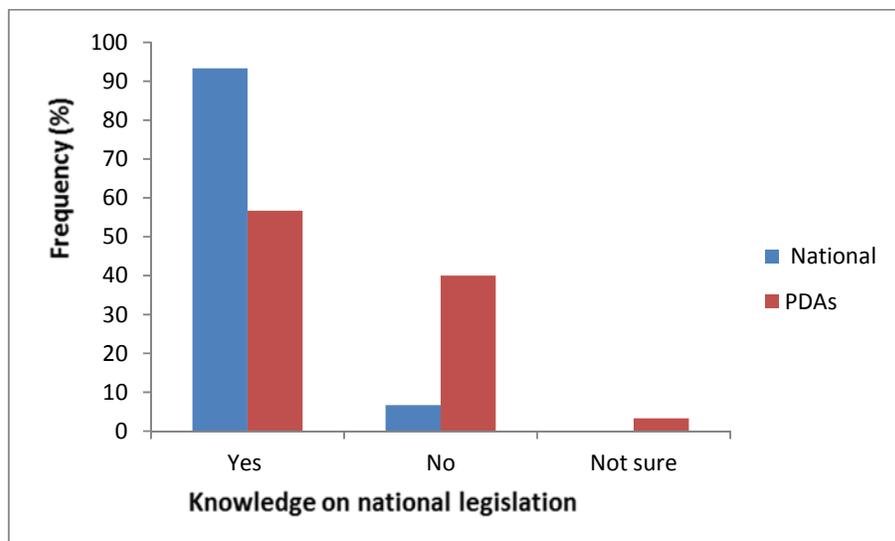


Figure 4. 8: Knowledge of the respondents on plant health national legislation

4.3.4 Knowledge of basic training on quarantine pests by the respondents

The findings in Figure 4.9 indicate that a majority of the respondents at the PDAs (80%) did not receive basic training on quarantine pests whereas only 20% of the respondents at the national authority showed that the relevant basic trainings are not being offered (Figure 4.9). However, some respondents (50%) at the national authority confirmed that they do receive relevant training on plant health matters through international training. Knowledge on plant health should be intensified in order to strengthen and improve plant health system (Flood, 2010).

Those who were not receiving relevant training indicated that such training is crucial and must be conducted in government. The respondents from the national authority pointed out that they received training on the following disciplines: “*WTO e-training, biosecurity training, Cochran fellowship programme: USDA training on plant health analysis, plant health risk analysis, pests identification training and in-house training, advance export training course, technical probation course for relevant legislation: APA, PIA and GMO, fruit fly management, taxonomy of plant pest, workshop on the International Standards for Phytosanitary Measures (ISPMs), risk assessment on alien and invasive species*”. According to *Article IV* of the IPPC (1997) one of the responsibilities of the NPPOs such as NPPOZA is to conduct training and development of staff.

The findings also reveal that 20% of the PDAs pointed out some areas in which they have received training which includes control of plant pests and disease and on how insecticides and pesticides are applied (Figure 4.9). They also received Fall armyworm and *Tuta absoluta* trainings. From the number of respondents at the provincial level, this is a very limited number or percentage of officials who have already received trainings. However, this needs to be intensified in accordance with the Kenya approach for “knowledge intensive approaches” (Flood, 2010). This will ensure that relevant trainings are provided equally at all spheres of government including the provinces. Once these pests are introduced, established and spread, provinces and farmers at that particular jurisdiction are hugely affected. Meaning that specialised knowledge and understanding is crucial to allow for rapid response to plant pests.

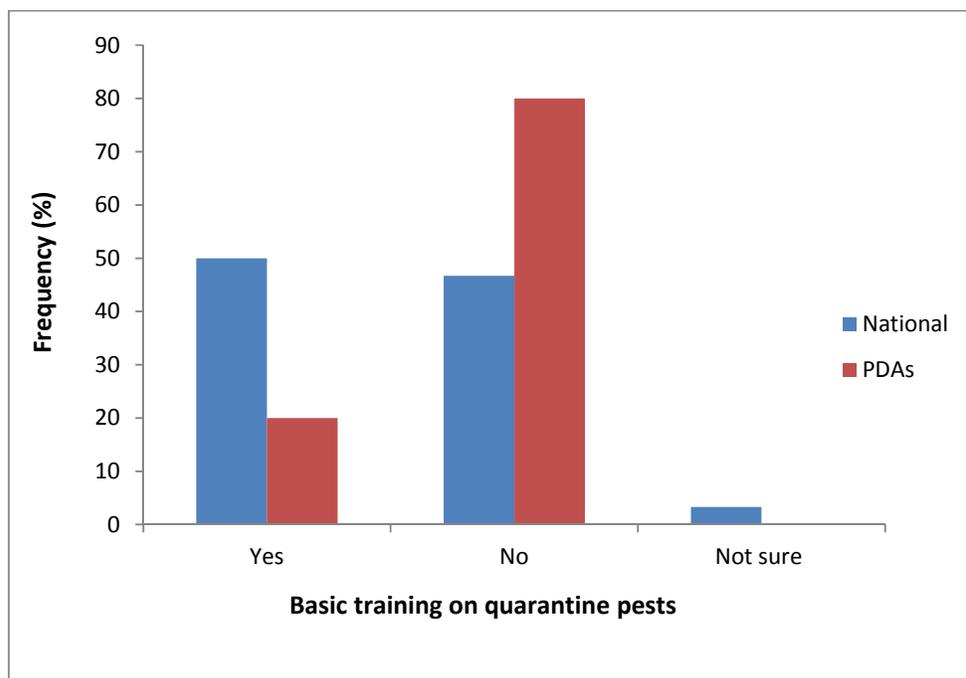


Figure 4. 9: Basic training on quarantine pests

4.3.5 Provision of inputs on plant health policy issues

The current findings indicate that a majority of officials at the PDAs (60%) did not provide inputs on policy issues during the development process. At the national

level, 53% of the respondents indicated that they did provide inputs on policy matters (Figure 4.10). According to article IV of the IPPC (1997) the contracting party such as the NPPOZA shall develop, issue and publish plant health regulatory framework within the context of the international prescripts. Considering that phytosanitary legislative framework is developed at national level, one would expect that the majority of national officials did participate in providing inputs on policy.

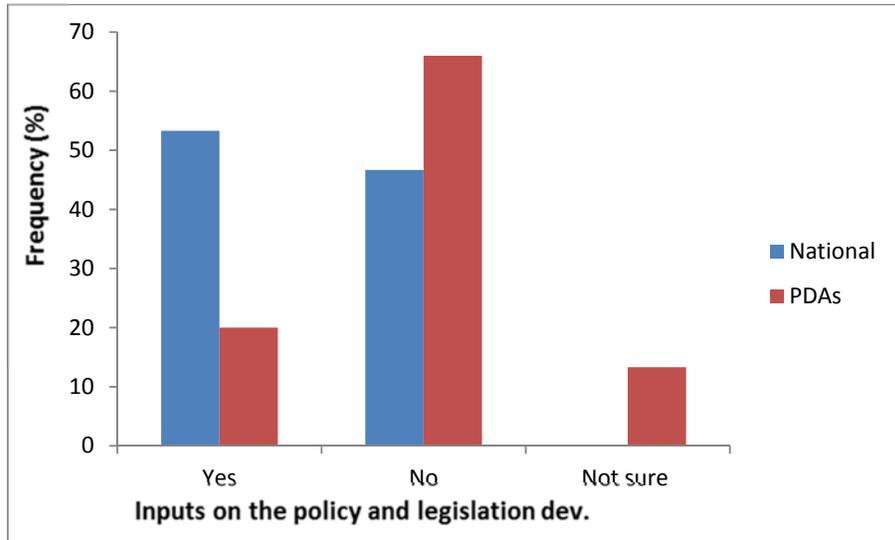


Figure 4. 10: Provision of inputs on the plant health policy by the respondents

4.4 Institutional arrangements

The effectiveness of the institutional arrangements is critical in the plant health system. This section seeks to investigate the effectiveness of the linkages of organs of state and identify areas to be improved with respect to the plant health system of South Africa. This section covers the understanding of the international framework concepts, existing linkages of the plant health system of SA with other government authorities and research institutes, formal linkages of the plant health structure, plant health structure within the spheres of government, participation in relevant forums, accessibility of plant health information by the farmers, budget allocation within the spheres of government for pest control and cooperative models for pest control.

4.4.1 Understanding of the international concept of plant health framework

The findings presented show that the majority of respondents (76.7%) at national departments had a significant level of international understanding of the plant health concept within the international framework (Figure 4.11). Contrary to that, 70% of the respondents at the provincial level lack understanding on plant health issues within the international concept. This may be as a result of exposure to relevant training within the plant health framework. This is concerning since agricultural advisors, extension officers and scientists at a provincial level are required to provide advisory services to the farmers. This knowledge gap may disadvantage farmers at district level or provincial level to participate in international trade and to enter into the export market. In a study conducted by Flood (2010) in Uganda, some of the respondents indicated the importance of plant health and expressed that whenever extension services is provided on production issues, it should cover all areas including pests and diseases control.

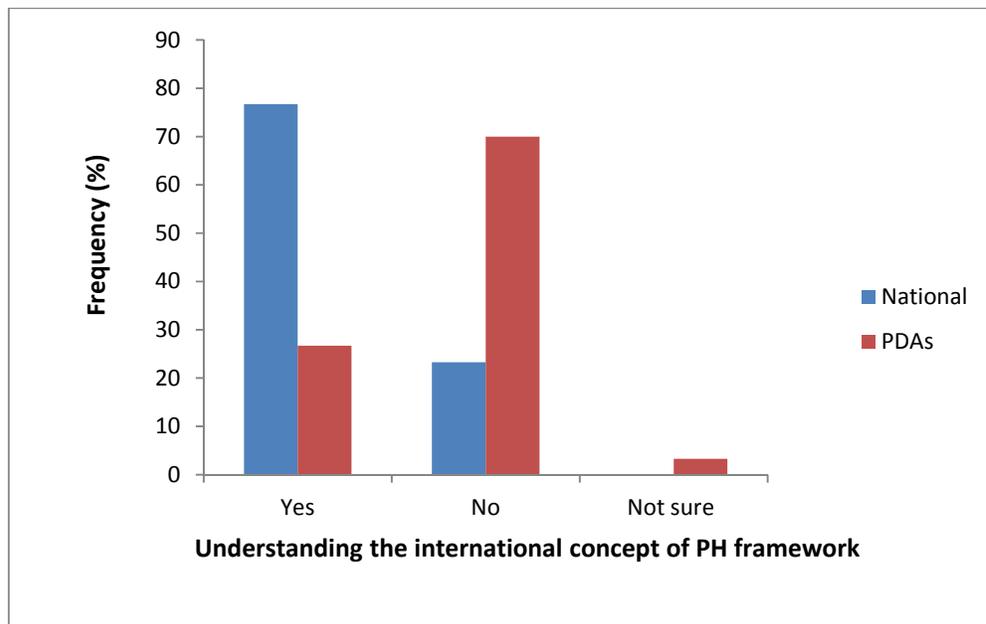


Figure 4. 11: Respondents 'understanding of the international plant health terminology

4.4.2 Understanding of the linkages of plant health system of South Africa

The results of the present study indicate that most of the participants at national level (86.7%) and only 40% of the respondents at the PDAs believed that there are good

linkages in plant health system of SA with other authorities (Figure 4.12). However, 50% at the provincial level feels strongly that the linkages do not exist. Furthermore, the findings indicate that the majority of officials within the national (70%) and provincial (56.6%) authorities believe that the plant health system of South Africa linked well with research organisations, such as the Agricultural Research Council (ARC), Citrus Research International (CRI) and some Universities (Figure 4.13). These linkages are found to be formalised through memorandum of understanding i.e. DAFF and ARC. This is consistency with the study conducted by Hanyani-Mlambo (2002) who reported that formal linkages should be based on policy prescripts. This was supported by Shaun (2017) who suggested that the linkages of the plant health system are critical for agricultural sustainability and these include linkage with various stakeholders, agricultural advisory services, regulatory and policy framework authorities as well as research components.

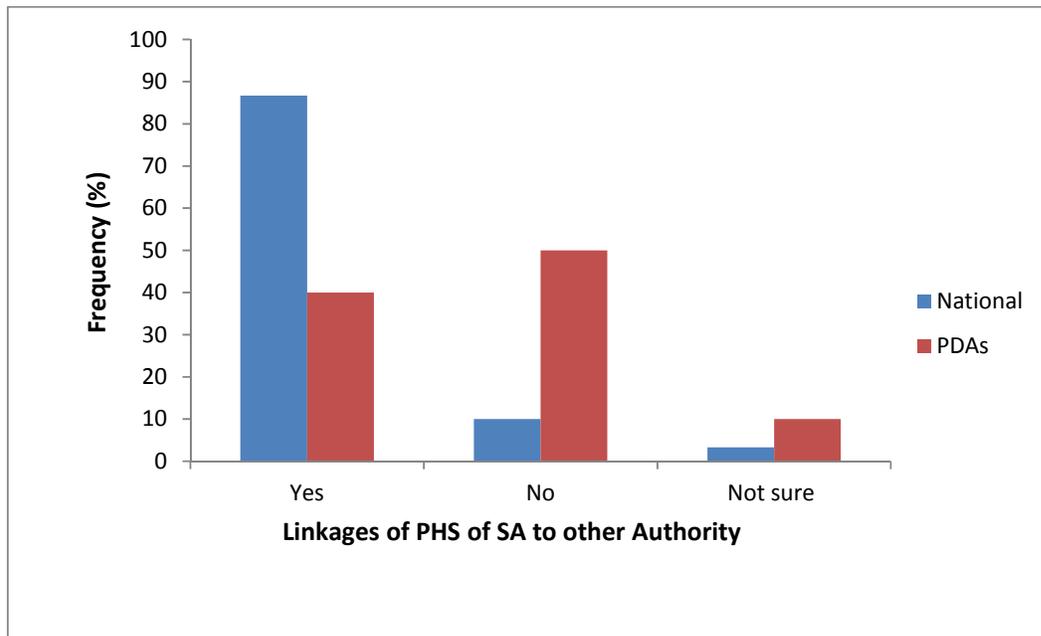


Figure 4. 12: Responses on the level of existing linkages of plant health system to other relevant authorities

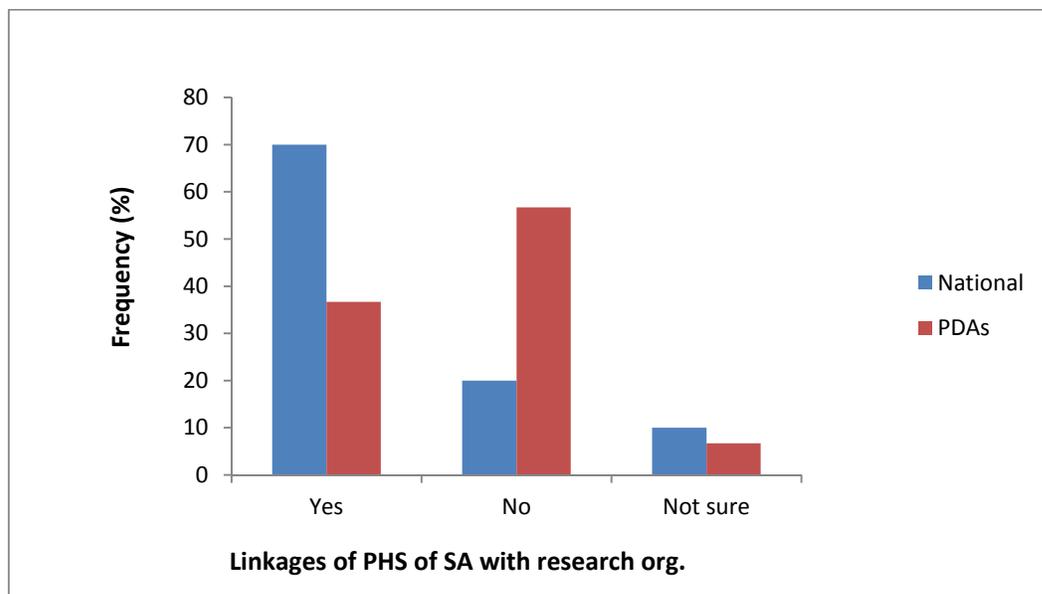


Figure 4. 13: Responses on the level of linkages of plant health with research institutions

4.4.3 Formal linkages of the plant health structure with other authorities

The findings presented in Figure 4.14 indicate that about 80% of respondents at the national level are of the opinion that there are formal linkages between NPPOZA and other authorities whereas, 76.7% of the respondents at the provincial level indicated that those linkages do not exist (Figure 4.14). The variation in terms of the percentages of the responses at provincial and national level may be as a result of respondents not being able to distinguish between formal and informal linkages. From practical observation, there are no formal linkages between the NPPOZA and the PDAs. The case study conducted by Hanyani-Mlambo (2002) revealed that formal linkages are those that are institutionalised, policy and legislative based. Regarding the formal linkages from the structure of the DAFF, NPPOZA, there appears to be a different perception on the existence of formal linkages between the national and provincial authorities.

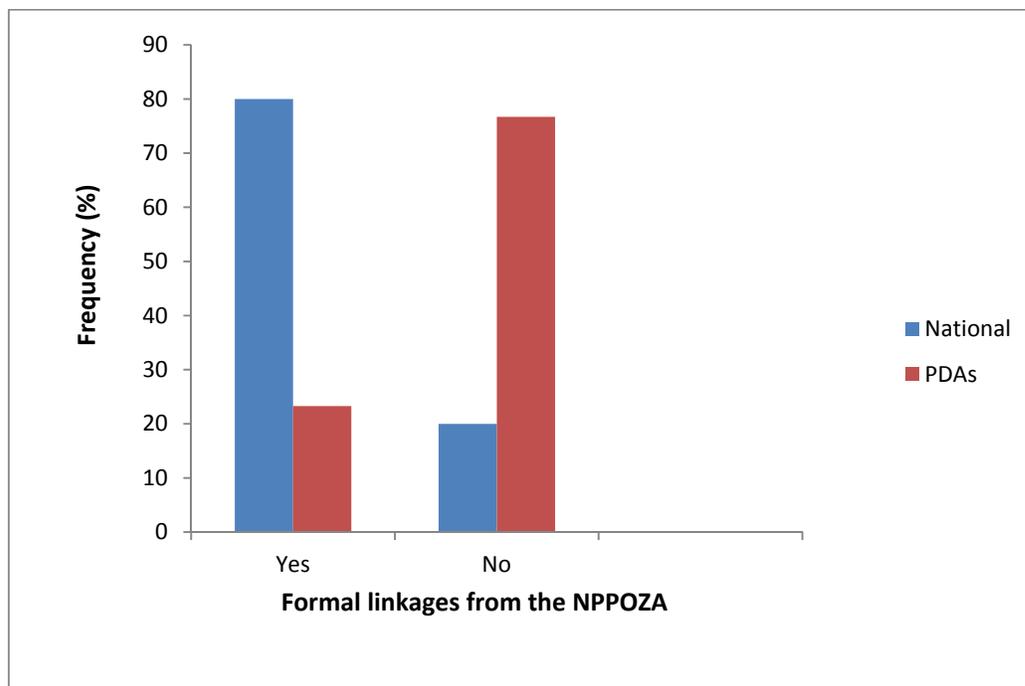


Figure 4. 14: Responses on the existing linkages from the structure of the NPPOZA to PDAs

4.4.4 Existence of the plant health unit within the spheres of government

The results in Figure 4.15 showed that the majority (76.7%) of respondents at relevant national authorities indicated that the relevant units or components on plant health matters do exist. However, 66.7% at the PDAs indicated that such units or components do not exist at provincial level. Furthermore, the majority of the national and provincial officials,(90% and 80% respectively) indicated the need for the establishment of the plant health unit at provincial level or PDAs (Figure 4.15.). The control of plant pests and diseases of economic importance is administered by a competent authority in many countries (IPPC, 2017). This component is a critical institution that facilitates trade (domestic and international).

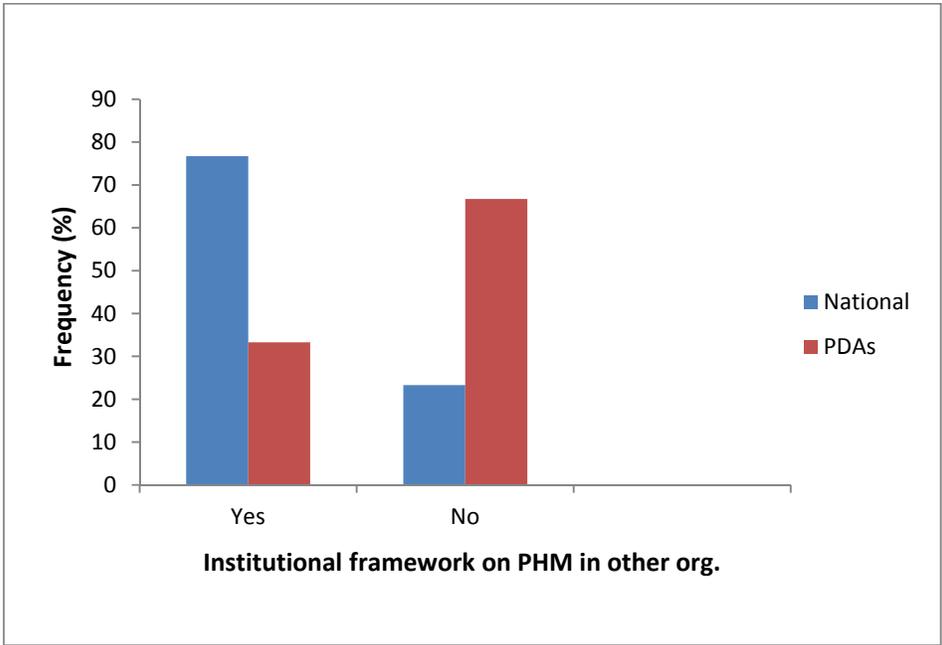


Figure 4. 15: Existence of plant health unit in the areas of the respondents

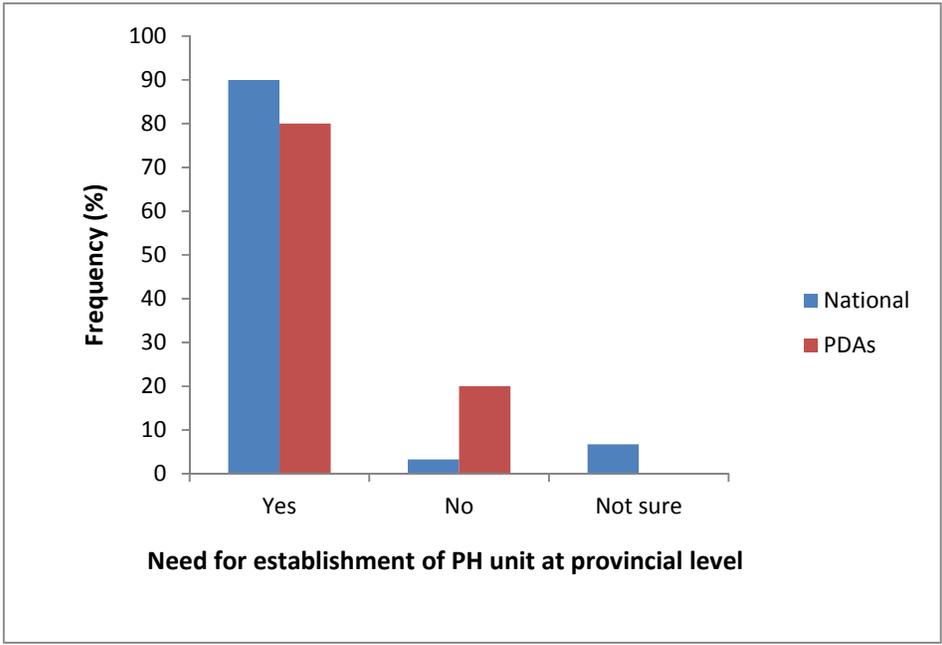


Figure 4. 16: Need for the establishment of the plant health unit at provincial level by the respondents

4.4.5 Accessibility of plant health information by the farmers

The results presented in Figure 4.17 show that most officials at national (73.3%) and provincial level (63.3%) indicated that accessibility to information by farmers was a challenge or farmers cannot access relevant information relating to plant health. These findings are consistent with the study of Benard (2014) who found that small-holder farmers in many African countries do confront challenges in terms of the accessibility to information as well as in obtaining appropriate updated information. In Uganda (Alokit, 2014), reported that the majority of farmers receive free extension services or relating to plant pests and diseases. The same sentiments were supported by the study of Danielsen & Matsiko (2016). This may be necessitated by the lack of extensive awareness amongst stakeholders on plant health matters. Plant health information is crucial for the benefit of the farmers; to participate in trade and production in general. Accessibility to information or advisory services by farmers will assist farmers at all categories to overcome or respond to any potential challenges confronted such as an outbreak of quarantine pests. Further indications were that such information is being requested from time to time by farmers.

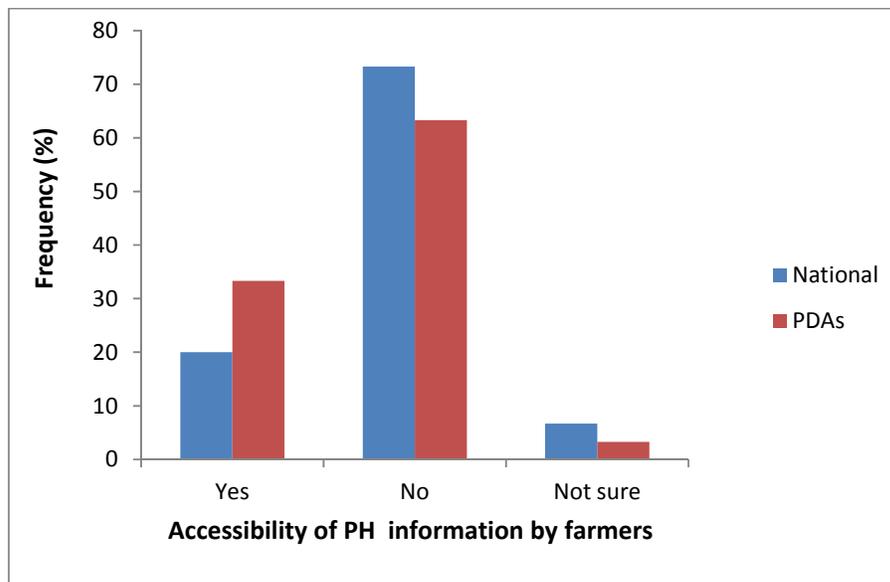


Figure 4. 17: Accessibility of information by farmers

4.4.6 Participation in relevant fora

The results shown in Figure 4.18 indicate that 53.3% of respondents at national level participate in relevant plant health fora whereas 66.7% at the provincial level do not participate in the relevant fora. Nevertheless, the findings presented in Figure 4.19 indicate that most of the respondents (83.3%) at national level and 70% at the PDAs pointed out the need to participate in the relevant plant health fora.

In South Africa, there are various plant health fora between DAFF and relevant role-players wherein matters associated with plant pest risk management are discussed. According to respondents from both the national and provincial level, the major relevant role-players include Fruit and Vegetable industry, Ornamental plants industry, importers and exporters, Assignees, producers and growers. Most of these fora are in relation to the control and management of plant pests and diseases in order to facilitate trade and production.

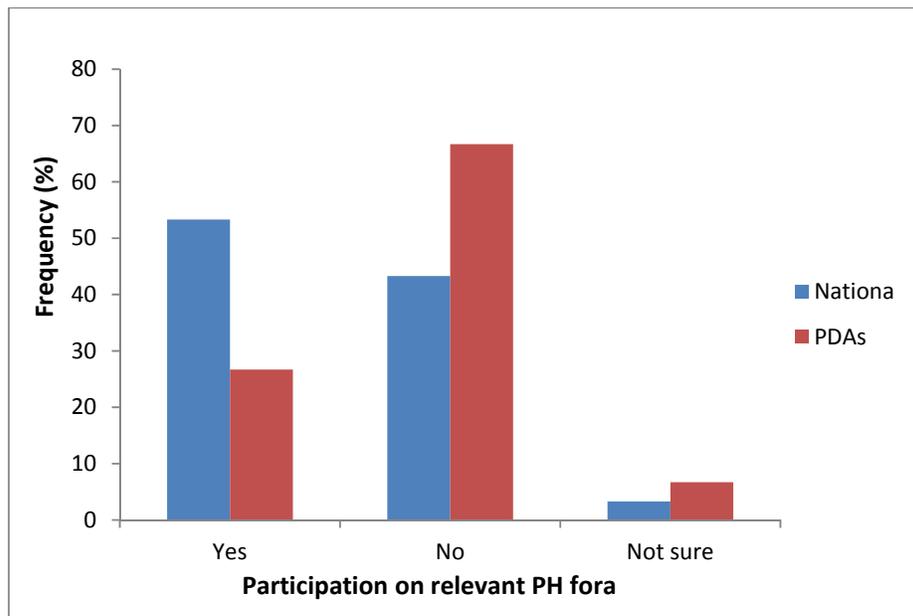


Figure 4. 18: Respondents' participation in various plant health fora

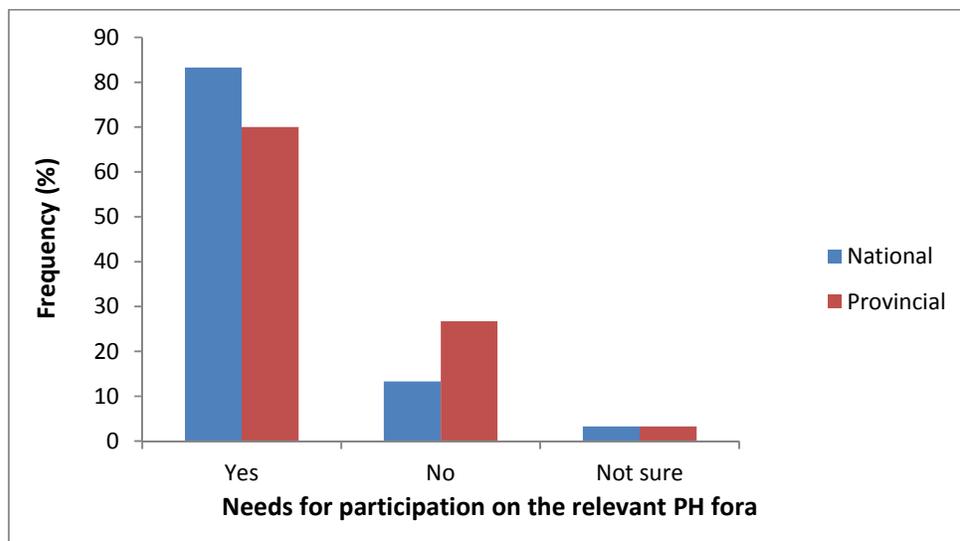


Figure 4. 19: Respondents' willingness to participate in plant health fora

4.4.7 Budget allocation within the spheres of government for pest control

The findings in Figure 4.20 show that 66.7% of respondents at the national and 80% of respondents at provincial levels confirmed that the budget for the control and management of plant pest and diseases is not centralised. This is consistent with the statement outlined by the Emergency Plant Pest Response Plan of South Africa (EPPRP) (DAFF, 2013b), which states that: insufficient budgeting may lead to pest outbreaks which may be difficult to control. This may have negative implications towards trade, food security and production in general. Respondents were further asked to elaborate on why budget is not centralised. The responses from the respondents were that: *“even if the budget is there, it is not sufficient for the control of an outbreak of plant pests. There is not enough a fund or budget for conducting inspection and surveillance of plant pests. Funds for disastrous pests are mostly allocated under the Disaster Funds of the DAFF, for example the control of Bactrocera dorsalis, Oriental fruit fly”*.

These funds are not necessarily accessible to respond quicker to a new outbreak of pests which needs emergency respond. Funds are not easily accessible since they are not managed by the relevant technical directorate which is the Directorate of Plant Health of the DAFF, which is part of the NPPOZA.

Furthermore, in support to a notion that the budget is not centralised, other respondents indicated that plant pest introductions are unpredictable and budget or funds must be the reprioritized, which is also a lengthy process. The respondents from the national authority confirm that poor allocation of budget such as on the issue of inspection and surveillance may lead to a lack of proper implementation of policy as well as in suspending such critical services or may compromise the efficiency and effectiveness of the plant health system. On budget commentary issues, some of the officials from the PDAs suggested that funds should be put aside to provide rapid response to a new outbreak rather than being reactive as the damage would persist while the funds are being solicited.

At provincial level, other respondents indicated that budget for the control of pests seems to be getting smaller and smaller and further suspected that political activities seem to get more priority. Other provincial officials confirmed that there was no specific budget for pest control as there is no plant health unit in almost all the provinces. However, fewer respondents pointed out that centralisation of budget may be a challenge since most of the units do have separate budgets. Based on the findings, this study suggests that relevant authorities at all spheres of government should have a specific budget which is separate from the disaster funds and it should be sufficient.

Some respondents from the provincial authority (PDAs) feel that it is difficult to comment on budgetary issues and further indicated that plant health matters are not well communicated to the grass roots officers in the province.

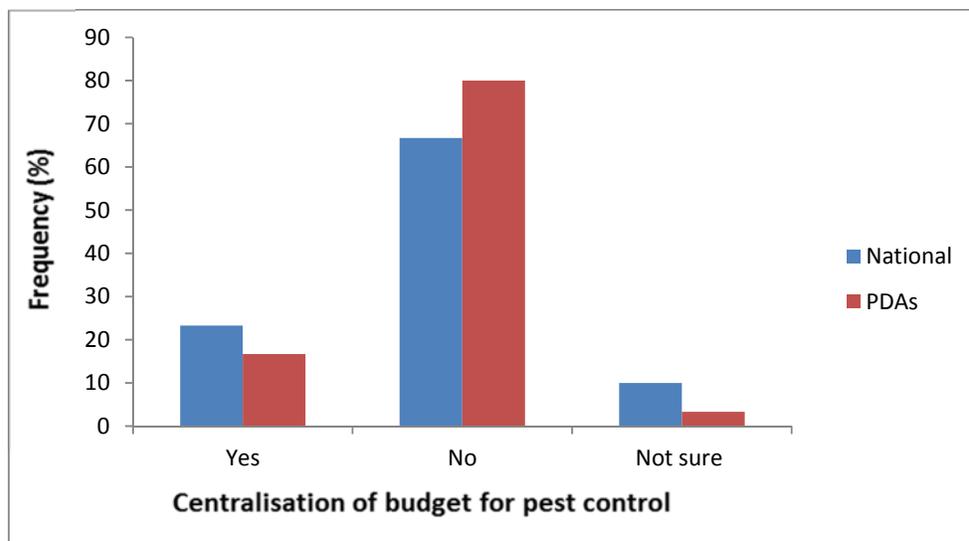


Figure 4. 20: Budget centralisation on the control and management of quarantine pests

4.4.8 Cooperative models for pest control

The findings in Figure 4.21 show the existing cooperatives models for pest control in South Africa. The respondents at national (50%) and provincial (63.3%) level believed that there were no cooperatives or collaborative models in South Africa in combating plant pests and diseases which may affect trade and production. The results of this study is contrary to the USA models which requires that the country should develop a collaborative approach system to combat plant pests and diseases which involves the universities, research institutions, states/provincial and local authorities, and industry as well as the community in general (USDA, 2015 & USDA, 2017). However, the respondents at the PDAs level express that the oriental fruit fly and the Fall armyworm are well coordinated.

For those who indicated that the models do exist, government was found to have other existing models with industries and some provinces similar to cooperative approach, such as Citrus Growers Association and South Africa Table Grapes Industry in controlling plant pests. Other collaborations listed were the Joint Steering Committees which involve industry, provinces, universities, ARC i.e. Fall armyworm

Steering Committee, *Bactrocera* Steering committee. The issue is to establish if these models are based on policy principles.

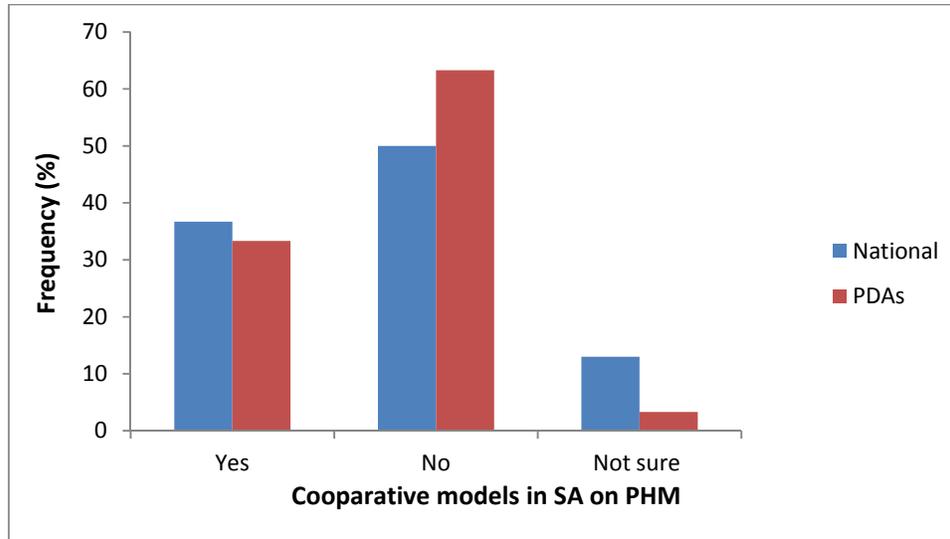


Figure 4. 21: Existing cooperatives models in SA for plant pest control

4.5 Legislative framework

This section of the study seeks to identify the existing limitations and risks on current legislation. Phytosanitary legislative framework is significant for the prevention, control and management of plant pests and diseases. It is therefore crucial that knowledge of relevant pieces of legislation is embodied within the relevant agricultural structures. This section covers the knowledge of the respondents of selected national legislation, overlapping issues amongst the selected pieces of legislation, transfer of certain powers and mandates from the APA to the provincial authority and other regulatory framework for pest control beside the APA and inconsistency on the selected legislation.

4.5.1 Knowledge on selected national legislation

The results in Table 4.2 show the percentages of the respondents from both the national and provincial authorities who indicated that they are aware of the selected

pieces of legislation. The findings indicate that a majority of officials (more than 60%) from all spheres of government are aware of the selected pieces of legislation (APA, PIA, GMO, PBRA, Act 36 of 1947, and NEMBA). According to the respondents, the NEMBA (93.3%) and APA (90%) appeared to be popular among the national respondents while PIA (76.7%) and GMO (73.3%) are popular at provincial level. However, this should not be interpreted as being knowledgeable about these pieces of legislation but it is merely being aware. With respect to NEMBA and APA it may be as a result that the majority of national authorities are mandated by these legislation i.e. the DAFF and DEA. According to DAFF strategic plan (2015) APA, PIA, GMO and PBRA, Act 36 of 1947 are primarily responsibility of the national authority within DAFF whereas the NEMBA is the responsibility of the DEA (RSA, 2004).

Table 4.2: Respondents (%) who were aware of the relevant pieces of legislation

Variables	National (%)	PDA's (%)
APA	90	66.7
PIA	86.7	76.7
GMO	80	73.3
PBRA	73.3	63.3
NEMBA	93.3	56.7
Act 36 of 1947	66.7	63.3

4.5.2 Overlapping issues amongst the selected pieces of legislation

The results as presented in Figure 4.22 indicate the overlapping issues on the selected pieces of legislation. Surprisingly, the respondents from the national (46.7%) and PDA's (70%) believed that there are no cross-cutting or overlapping issues among the relevant pieces of legislation. This is in contradiction with the literature search in terms of legislative framework which identified cross-cutting aspects between the APA and the NEMBA (RSA, 2017, NEMBA, 2016) .This could be due to a lack of understanding by the respondents on legislative issues as most of the legislative aspects are complex and may be challenging to most of the

officials. However, those respondents at the national (43.3%) and provincial levels (26.7%) who believed that the areas of overlapping among legislation exist pointed out that APA and NEMBA do have some areas of commonalities especially on the import provisions. Furthermore, respondents also pointed out that the *Bactrocera dorsalis* (Oriental fruit fly) which is a quarantine pest in SA has been listed in terms of the APA, Control Measures R.110 and NEMBA regulations for national control (RSA, 2017 & NEMBA, 2016).

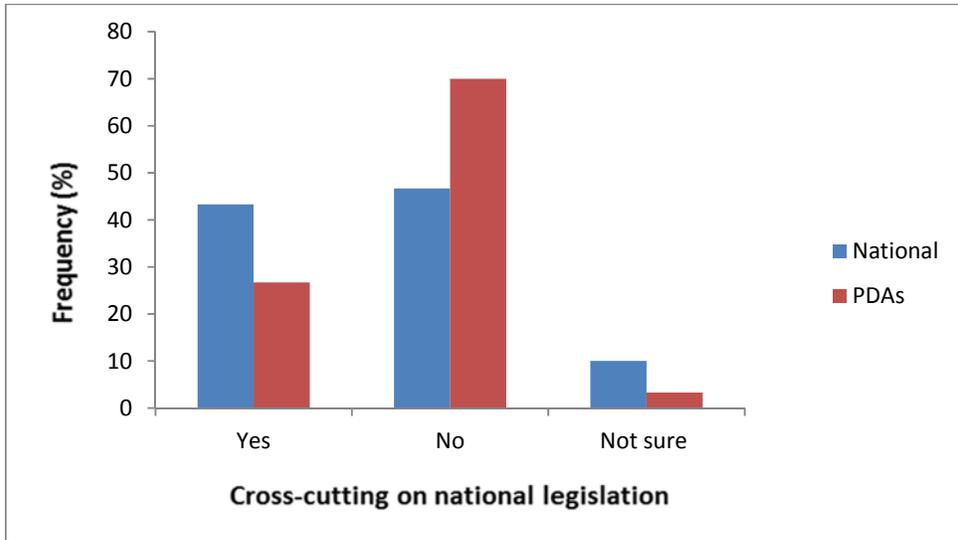


Figure 4. 22: Cross-cutting among pieces of legislation

4.5.3 Cross referencing and harmonisation between relevant pieces of legislation

In Figure 4.23, the findings presented reflect if cross referencing exists amongst selected legislation. The majority of respondents, at national (70%) and at PDAs (73.3%) levels believed that there is no cross referencing among the selected legislation. In addition, more respondents from both the national (56.7%) and PDAs (60%) believed that there is a need for harmonisation of the pieces of legislation such as APA and NEMBA and PIA on import provisions (Figure 4.24).

The respondents believe that if cross referencing and harmonisation is applied, “this will promote access to information and enhance service delivery”. Furthermore, officials from the PDAs also believe that “if all sections dealing with import provisions

can be linked, there would be less contradictions and more clarity”. Others further suggested that it will improve efficiency and effectiveness.

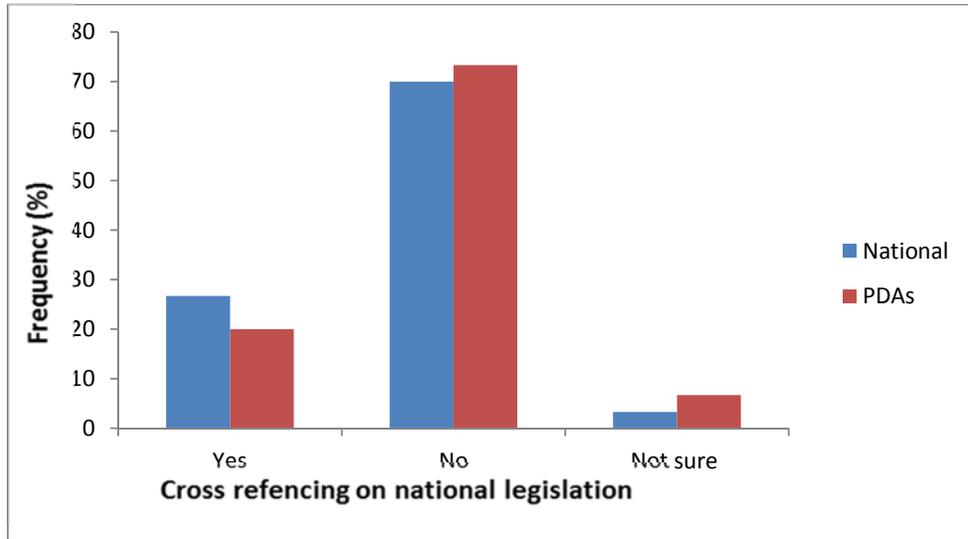


Figure 4. 23: Existing cross referencing with regard to national legislation

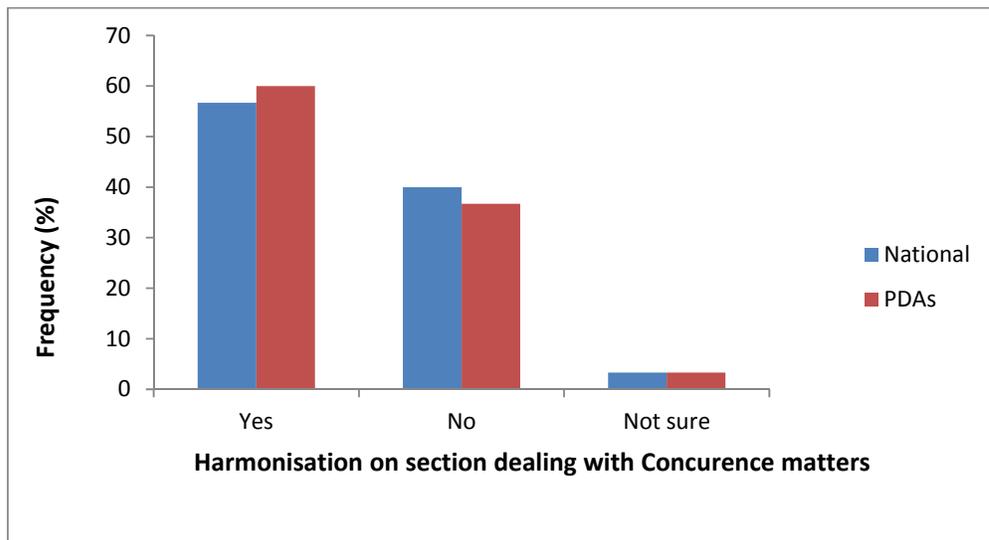


Figure 4. 24: Harmonisation of specified legislation

4.5.4 Transfer of certain power to the APA to the provincial authority

The results as shown in Figure 4.25 indicate the responses of the respondents in terms of transferring of power from the APA to the provincial authority. These

findings indicate that (53.3%) of the national respondents and only 43.3% of the PDAs respondents indicated that enforcement power should be transferred to the provincial level. However, this is consistent with the Plant Health Bill, 2017 which is repealing the Agricultural Pests Act, 1983 (Act No.36 of 1983) (RSA,2016). The Bill provides for the assistance and cooperation by all spheres of government which emanated from the Bill of Rights of the Constitution of the Republic (RSA, 2016). However, this Bill does not specifically indicate specific roles of the PDAs. Respondents were requested to elaborate and one of the respondents further indicated that functions of plant health must be properly defined so that extension officers can also be capacitated on the transferred powers of the relevant sections. In the USA, the mandate of plant pests management is not only vested at the national level, this has been extended to the states (which in South Africa refers to as provinces), through the Federal legislation (USDA, 2017). The Australian model was also found to be similar to the United State Model.

Other respondents from PDAs believe that transfer of power to the provincial authority will “reduce the workload from the National authority. The majority of respondents at national level believe that if some powers are transferred from the APA to the provincial authorities, PDAs will assist with pest surveillance and rapid response, issuance of relevant permits. Respondents who understand the importance of information reported to that accessibility to plant health matters is a challenge as it cannot reach the end-users (farmers). The understanding is that if certain powers and functions are transferred to those who work very closely with the farmers, there would be a flow of plant health information on regulatory framework. It is suggested that this should be formalised through legislative instruments. Currently, the national departments are the custodians of the administration of the relevant pieces of legislation such as the APA.

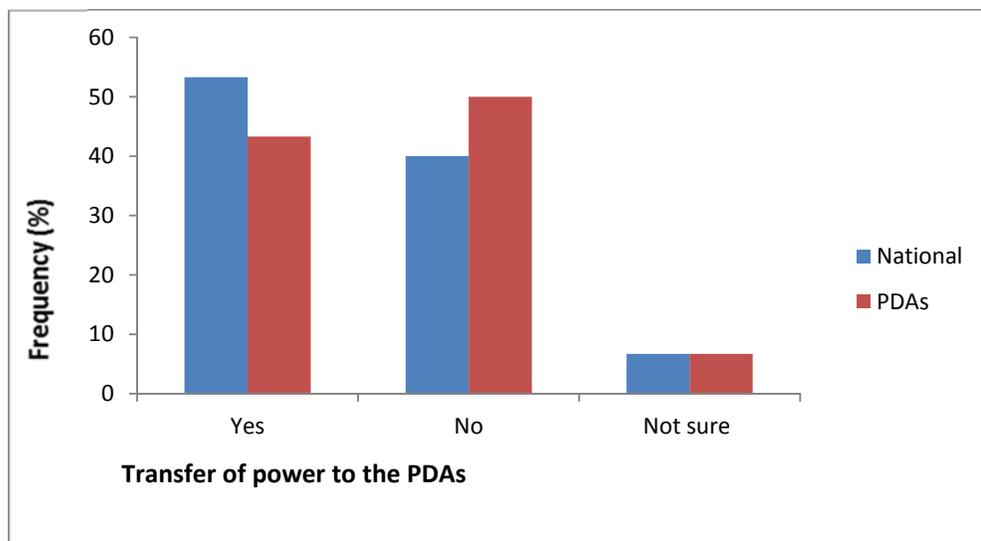


Figure 4. 25: Transfer of power to the PDAs

4.5.5 Other regulatory framework for pest control

The results presented in Figure 4.26 indicate that many respondents at the national (73.3%) and provincial levels (90%) did not believe that there were by-laws or any other regulatory framework at provincial level to prevent, control and manage the outbreak of quarantine pests or regulated pests. These findings are in contradiction with the existing South Africa Emergency Plant Pests Response Plan (SAEPPRP) (DAFF, 2013) which is a framework to manage pest outbreaks. Provincial roles and responsibilities are outlined on the SAEPPRP. Furthermore, these findings are also contrary to the provisions of NEMBA: Alien and Invasive Species Regulations which also deal with invasive species e.g. *B. dorsalis*. In the USA, although there is a national law such as the Plant Quarantine Act, 2000, there are Federal legislation executed by the states or local authorities in order to control and manage plant pests and diseases (USDA, 2017).

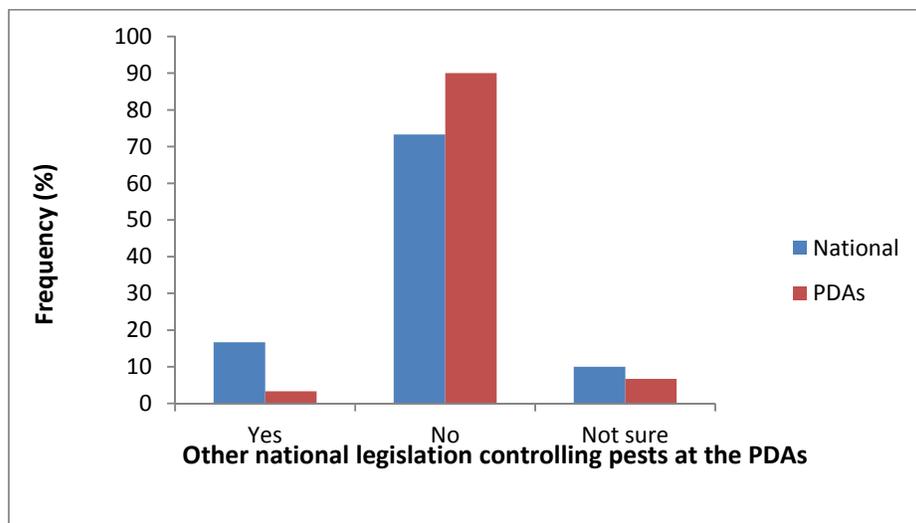


Figure 4. 26: Other legislation regulating plant pests and disease at provincial level

4.5.6 Inconsistency on the selected legislation

The findings presented in Figure 4.27 show inconsistencies on the selected legislation. The majority of respondents at national (66.7 %) and 73.3% at the PDAs believe that there are no inconsistencies amongst pieces of legislation. This is contrary to the DAFF legislative review process which has identified several areas of inconsistency hence the proposed new legislation on APA, PIA, PBRA which are currently undergoing Parliamentary processes (RSA, 2016). Furthermore, it is clear that most of the respondents do not understand the complexity associated with legislative development. These legislative frameworks are outdated and needed to be aligned with up to date international and national obligations. Although a limited number of respondents believe that the area of inconsistency on the Agricultural Pests Act does exist, such as the issue of controlling migratory pests in South Africa which affects crops of economic value. In terms of the APA, the relevant authority to control migratory pests is the Directorate Climate Change and Disaster Management of the DAFF.

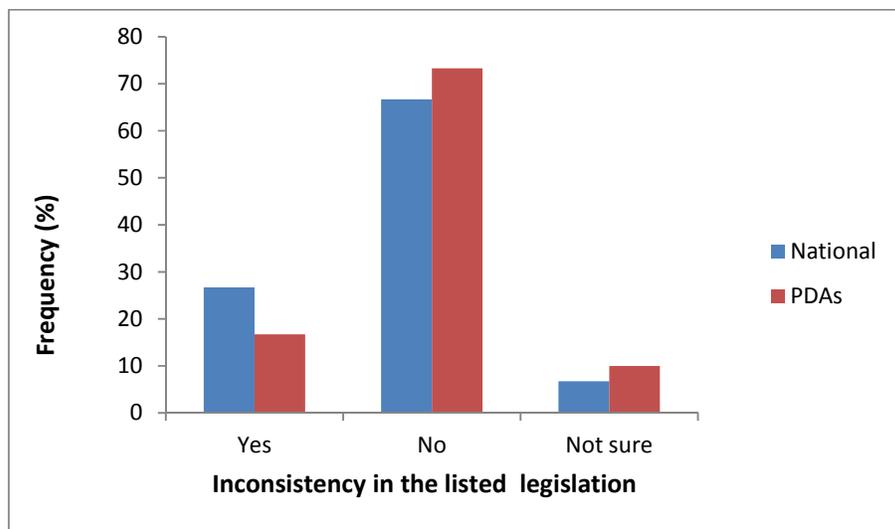


Figure 4. 27: Inconsistency on the specified legislation

4.7 Results and discussion of Spearman’s rank correlation coefficient analyses

The spearman’s rank correlation coefficient was employed to determine the relationship between various variables in this study. This section covers the correlation coefficient between two variables under the following subheadings: knowledge on plant health system, institutional arrangements and legislative framework of the selected pieces of legislation. The findings under this section were based on the combined data from both national (DEA and DAFF) and provincial (PDAs) authorities.

4.7.1 Knowledge and understanding on plant health matters

The objective was to identify the existing knowledge gaps on phytosanitary matters at both national and provincial levels. Knowledge in relation to plant health is often undermined. In this section of this study, the following correlations were covered: education and provision of inputs on policy issues, place of employment and the level of knowledge and understanding on plant health system, basic training and knowledge and understanding on plant health system and basic training on quarantine pests and the level of providing inputs on plant health policy issues.

4.7.1.1 Education and provision of inputs on policy issues

The relationship between education and provision of inputs on policy issues was determined and is presented in Table 4.3. The findings show that there was negative correlation between education and provision of inputs on policy issues ((r) (60)=-0.132, P=0.316). This implies that despite qualifications or education, it does not mean that government officials will have a significant impact towards provision of inputs on policy issues.

Contrary to this, it would be expected that qualifications especially on the specialised disciplines on plant health matters will contribute to knowledge enhancement. This is because certain universities like the universities of North West, Pretoria and Stellenbosch do offer basic principles on plant health or crop protection, which include Plant Pathology, Entomology and Weed science (UP, 2015; DAFF, 2017b). However, one would expect that the relationship does exist and basic knowledge is demonstrated in policy issues. Ebbels (2003) reported that most graduate students and government officials worldwide are not exposed to the extensive knowledge of plant health and quarantine matters as these are not covered in their syllabi at university level.

4.7.1.2 Place of employment and the level of knowledge and understanding on plant health system

As shown in Table 4.3, place of employment positively correlated with knowledge on plant health system ((r) (60)=0.404, p=0.001). The results suggest that officials exposed to plant health matters and work at national level will have a significant knowledge on plant health system. Jele and Nxele (2017) confirmed these findings in a technical Report: Southern Africa Phytosanitary Inspection Workshop. The authors reported that plant health legislative and policy framework are administered by the national authority, and they further suggested that provincial authorities could also play a pivotal role in performing necessary phytosanitary procedures for pest control. However, this proposed provincial mandate is not yet legislated. Similarly, in countries like Kenya, the plant health regulatory framework is embodied at a national

level and the national authority does not provide for extension services (Boa, 2013). Therefore, it is expected that place of employment does play a role in determining the level of knowledge on plant health system.

4.7.1.3 Knowledge of basic training and knowledge and understanding on plant health system

In Table 4.3, the results show that there was a positive correlation between knowledge of basic training on quarantine pests and knowledge and understanding of plant health system ($(r) (60) = 0.329, p=0.010$). The correlation is significant at 5% level of significance and shows that basic training on quarantine a pest does contribute to the level of knowledge and understanding on plant health system. Ebbels (2003) published a book which covers “the principles of plant health and quarantine” and supported that training is a crucial part within the structure of the NPPOs and further suggested that basic training in a specialised field should always be conducted in order to keep up with new phytosanitary developments for pest control.

4.7.1.4 Basic training on quarantine pests and the level of providing inputs on policy issues

The results in Table 4.3 indicate that there was a positive association between basic training on quarantine pests and the level of providing inputs on policy issues ($(r)(60)=0.466, p=0.000$). Basically, this means that the more the officials receive relevant basic trainings, the more the level of knowledge will increase, which leads to active participation in providing inputs on policy issues. It is evidently shown that basic training on quarantine pests can assist both the national and provincial authorities in providing inputs on policy issues relating to plant health matters. As already proven by Ebbels (2003), training is an essential element to enhance technical skills and knowledge on international agreements and protocols which leads to effective participation in plant health activities. This is also consistent with the positive correlation which was determined between the basic training on

quarantine pests and understanding and knowledge on the international prescripts ((r) (60) =0.377, p=0.003).

Table 4.3: Spearman's correlation coefficients on biographic information and knowledge and understanding on plant health matters (n=60)

Variables	Knowledge and understanding on plant health system	Understanding and knowledge on national legislation	Understanding and knowledge on international prescripts	Provision of inputs on policy issues
Education	0.076 ^{NS}	0.001 ^{NS}	0.055 ^{NS}	-0.132 ^{NS}
Designation	0.453 ^{**}	0.403 ^{**}	0.310 [*]	0.44 ^{**}
Place of employment	0.404 ^{**}	0.425 ^{**}	0.439 ^{**}	0.504 ^{**}
Work experience	0.225 ^{NS}	0.360 ^{**}	0.370 ^{**}	0.282 [*]
Basic trainings on quarantine pests	0.329 [*]	0.397 ^{**}	0.377 ^{**}	0.466 ^{**}

Correlations are highly significantly at p<0.01 (**), significant at p<0.05 (*) or non-significant (NS)

4.7.8 Institutional arrangements analysis

Effective plant health institutional arrangement is very critical for control and pest management in order to address matters in relation to food security, production, market access and trade in general. This section of the study seeks to identify critical areas and gaps to be addressed in the current institutional framework of South Africa. The correlation coefficient covers the following: formal linkages and understanding and knowledge on relevant pieces of legislation, formal linkages and provision of inputs on policy issues, establishment of plant health units and knowledge and understanding of plant health system, plant health unit and provision of inputs on policy issues, linkages of the plant health system with research institutions and knowledge and understanding on the relevant national legislation, existing cooperative models for pest control and knowledge and understanding on national legislation.

4.7.8.1 Linkages of the plant health system with other authorities and understanding and knowledge on relevant national legislation

In Table 4.4 shows a strong positive correlation between linkages of the plant health system with other authorities and the understanding and knowledge on relevant national legislation affecting plant health matters ($(r(60)=0.641, p=(0.000)$). This implies that the effectiveness of linkages of plant health system with other authorities does enhance the level of understanding and knowledge on relevant pieces of legislation, especially those listed in this study. This correlation is in line with a case study conducted in Zimbabwe by Hanyani-Mlambo (2002) who reported the importance of linkages of the relevant agriculture structure to ensure sustainability in agriculture.

4.7.8.2 Formal linkages and understanding and knowledge of relevant pieces of legislation

As shown in Table 4.4, the existence of formal linkages of the NPPOZA to other components correlated to the understanding and knowledge on relevant or applicable national legislation ($(r(60)=0.501, p=0.000)$). Similarly, the existence of formal linkages within the relevant structures such as the NPPOZA would ensure that all relevant authorities or structures are aware and knowledgeable of the applicable national legislation. Hanyani-Mlambo (2002) also found that formal linkages are critical and must be legally and institutionally based. In the present study and consistent with the provincial feedback, formal linkages to provincial authorities within SA on plant health matters is still a challenge.

4.7.8.3 Formal linkages and provision of inputs on policy issues

The results presented in Table 4.4 show the relationship between formal linkages within the NPPOZA to other units or authorities as well as provision of inputs on policy issues. The results of this study show that there is a positive relationship between the variables in question and was statistically significant ($(r(60)=0.576,$

$p=0.000$). Statistically, proper formal linkages of the structure of the NPPOZA would positively contribute to the level of providing inputs on policy issues.

The New Revised Text of the IPPC Article IV (1997) states that contracting party to the IPPC should make and/or establish to the best of its ability, for an official national plant protection organisation in order to execute the responsibilities thereof. According to the RSA (2014), the DAFF, NPPOZA has the mandate to administer and implement the plant health matters on legislative policy issues. This is supported by the study by Chinappen (2011) who confirmed that policy and legislative matters are the mandate of the national authority relating to plant health matters. The AU (2013) in its final report proposed the framework of the NPPOs structure which should be adopted by the various NPPOs. The proposed NPPO structure did not cover for extension services. The AU (2013) concluded that such a structure should be well capacitated. In South Africa, the NPPOZA was established in accordance with the requirements of the IPPC obligations without providing for extension support.

The NPPOZA comprises of the directorates Plant Health, Inspection Services and Food Import and Export Standards. However, DAFF's current legislative framework on plant pest control does not provide for the provincial structure as a primary contributor in implementing plant health policy (RSA, 2014; DAFF, 2013).

4.7.8.4 Established plant health unit and knowledge and understanding of plant health system

As shown in Table 4.4, there was a connection between existence of the plant health unit within the spheres of government and knowledge and understanding of plant health system ($(r) (60) = 0.358, p=0.005$). This implies that where there is a plant health unit within the spheres of government, the level of knowledge and understanding is expected to increase. As it has already been established, the plant health units which are specialised disciplines are vested at the national authority (RSA, 2014). Although it is important to establish a plant health unit at provincial and local government, the study conducted by Danielsen and Matsiko (2014) in Uganda found that there were some difficulties in establishing plant health units such as the

“plant health clinics” at a provincial level. It was found that other factors may hinder such processes, for instance, political interference and lack of required resources (laboratories).

4.7.8.5 Plant health unit and provision of inputs on policy issues

The results of the correlation between the availability of plant health unit within the spheres of government and the provision of inputs on policy issues relating to plant health are presented in Table 4.4. The correlation was strongly positive between these two variables which was highly significant ($(r)(60)=0.600, 0.000$). Similarly, the existence of the plant health unit has a direct link in ensuring that officials provide inputs on policy issues. Since this unit would be responsible and dealing with matters of quarantine importance, it should of course be guided by the national and international policy framework. In other countries like Kenya and Uganda there is an extension services support of the plant health unit which is usually referred to as “plant health clinics” wherein the plant doctors assist the farmers in pest identification and advisory services (Flood, 2010; Danielsen & Matsiko, 2014). This programme was found working well in Kenya.

4.7.8.6 Linkages of the plant health system with research institutions and knowledge and understanding on the relevant national legislation

The linkages of the plant health system with research institutions positively correlated with the knowledge and understanding on the relevant national legislation ($(r) (60) =0.265$), $p= 0.001$) (Table 4.4). This is connected in the sense that researchers and/or scientists should be knowledgeable to the applicable legislation to ensure compliance with the applicable laws regarding research findings. For example, the Control Measures R.110 of January 1984 as amended which provide for compulsory reporting, requires that any occurrence or suspected occurrence of a new pest or quarantine pest must be reported to the executive officer of the Agricultural Pests Act, 1983 (Act No.36 of 1983) (RSA, 2014; RSA, 2017). Researchers also assist in pest identification and confirmation, for example the ARC. This connection was supported by the overarching MOA between the DAFF and

ARC (DAFF, 2012). Although this needs to be expanded and sufficiently budgeted for regarding plant health issues for plant pest control and management.

4.7.8.7 Existing cooperatives models for pests control and knowledge and understanding on national legislation

The findings presented in Table 4.4 show a weak but positive correlation between existing cooperatives models for pests control and knowledge and understanding on national legislation. Although the connection was not too strong, there was a positive correlation between these two variables ($(r) (60) = 0.265, p = 0.041$). These findings were supported by the models in countries like the United States of America (USA). The United States Department of Agriculture (USDA) has established the cooperative or collaborative approach to control and manage emerging plant pests and diseases. This includes all major role-players and stakeholders such as Universities, research institutes, industries, communities, farmers, growers as well as different states/provinces. All these stakeholders are required to have knowledge on the Plant Quarantine Legislation. This collaboration approach is designed in such a way that there are MOU and contracts with the USDA (USDA, 2015).

In the case study of Hanyani-Mlambo (2002), collaboration is critical for efficiency in terms of resource mobilisation and further recommended that to ensure success on the collaborative model; the strategy should be developed and implemented accordingly. In South Africa, most of the collaborations are performed case-by-case, which are not necessarily formalized. According to Chinappen (2011), collaboration in plant health system is a key and this should involve the community in general.

Table 4.4: Spearman's correlation coefficients on institutional arrangements and to determine the relationship with knowledge and understanding on plant health matters (n=60)

Variables	Knowledge and understanding on plant health system	Understanding and knowledge on national legislation	Understanding and knowledge on international prescripts	Provision of inputs on policy issues
Linkages of national and international institutional framework	0.403*	0.446**	0.494**	0.354**
Linkages of PHS with other authorities	0.288*	0.641**	0.592**	0.203 ^{NS}
Formal linkages of the NPPOZA to other units	0.298*	0.501**	0.510**	0.576**
Availability of PH unit	0.358**	0.466**	0.485**	0.600**
Linkages of PHS of SA to research institution	0.198 ^{NS}	0.405**	0.287*	0.248 ^{NS}
Cooperative models for pest control	0.060 ^{NS}	0.265*	0.240 ^{NS}	0.016 ^{NS}

Correlations are highly significantly at $p < 0.01$ (**), significant (*) at $p < 0.05$ or non-significant (NS)

4.7.8.8 Linkages of plant health system with other authorities and budget allocation

As presented in Table 4.5, there was a slight connection between linkages of the plant health system with other authorities and budget centralisation was presented ($(r)(60)=0.055$, $p=0.675$). This may be due to the fact that there is lack of stronger linkages amongst the role-players and fragmentation of budget allocation on plant health issues. This finding is consistence with the study conducted by Danielson & Matsiko (2014) in Uganda which found that the resource allocation at all spheres of government for plant pests and diseases control were not strong.

According to the Disaster Management Act, No.57 of 2002 there are National Disaster Management and Provincial Disaster Management systems which are provided for in terms of the specific declaration of disaster. Under this Act, pests may be declared a disastrous pest although they are not specified as such. However, the Agricultural Pests Act provides for the prevention and control of plant pests and this

Act must be sufficiently funded to achieve its objectives. According to this Act of Parliament, the Agricultural Pests Act, 1983 (Act No.36 of 1983), section 8 states that “the Minister may out of moneys/monies appropriated by Parliament for that purpose do any act on or with respect to any land that he/she considers necessary in order to further the objects of this act”. The act which must be sufficiently funded for management and control of plant pests is the APA. It is important that different institutions engage one another to avoid misallocation of budget for pest control. The mandate for the NPPOZA for effective and efficient implementation of plant health regulatory framework for plant pests and diseases control is very crucial.

4.7.8.9 Existence of formal linkages and participation in relevant plant health fora

The results of the association between the formal linkages from the NPPOZA to other units and the level of participation in relevant plant health forums are presented in Table 4.5 and a positive correlation was found to exist ($(r) (60)=0.333, p=0.009$). Formal linkages within the structure of the plant health system can encourage participation in relevant fora. Hanyani-Mlambo (2002) suggested that most of the formal linkages amongst the institutions are based on the documented procedures, responsibilities and goals. In South Africa, formal linkages are based on policy and legislative framework, memorandum of understanding/agreement (MOU/A), Service Level Agreements (SLA). Furthermore, other South African relevant forums are established in terms of the Terms of Reference being developed with all role-players.

4.7.8.10 Existence of formal linkages and knowledge of the Agricultural Pests Act, 1983

As this study is focused on the plant health system of South Africa, the results of the connection between the formal linkages and knowledge of the Agricultural Pests Act, 1983 (Act No. 36 of 1983) in the national and provincial authorities were analysed and presented in Table 4.5. There was a positive connection between the variables which was statistically significant ($(r)(60)=0.434, p=0.001$). It means that if there are formalised linkages within the NPPOZA structure with other relevant units, this will

influence the level of knowledge of the APA to increase amongst stakeholders. This would assist in providing effective and appropriate advisory services (which is based on legislation) to farmers, growers, producers, exporters and importers. Cameron *et al.* (2016) found that effective communication to small-holder farmers is critical and concluded that advice to the farmers must also be based on legislation and latest information.

4.7.8.11 Linkages of plant health system to research institutions and budget allocation for pest control

The findings between the relationship of linkages of plant health system to research institutions and budget allocations/centralisation for pest control are presented in Table 4.5. There was a positive correlation between these two variables, which was significant ((r)(60)= 0.299 p=0.020). A proper linkage of the NPPOZA with various research institutes is essential as the research component will assist in doing research for new pests as well as pest identification and confirmation.

Table 4. 5: Spearman’s correlation coefficients on plant health institutional arrangements (n=60)

Variables	Participation in relevant forums	Budget allocation/centralisation for pest control	Knowledge of Agricultural Pests Act
Linkages of PHS with other authority	0.115 ^{NS}	0.055 ^{NS}	0.261*
Formal linkages of the NPPOZA to other units	0.333**	0.070 ^{NS}	0.434**
Availability of PH unit	0.225 ^{NS}	0.120 ^{NS}	0.469**
Linkages of PHS of SA to research institution	0.140 ^{NS}	0.299*	0.253 ^{NS}

Correlations are highly significantly at p<0.01 (**), significant (*) at p<0.05 or non-significant (NS)

4.7.9 Legislative framework of selected pieces of national legislation: analysis

Phyto-sanitary legislative framework is significant for the prevention, control and management of plant pests and diseases. The correlation in relation to the legislative

framework was determined in order to identify the existing limitations and risks on current legislation. In summary, this section covers the correlation between the following: the NEMBA and understanding and knowledge on relevant national legislation, NEMBA and other selected pieces of national legislation, the APA and understanding and knowledge on relevant national legislation, the APA and knowledge and understanding of plant health system, the APA and overlapping issues on the NEMBA, the APA and overlapping issues with other legislation, inconsistency amongst selected pieces of legislation and cross referencing, inconsistency on the selected pieces of legislation and harmonisation.

4.7.9.1 Inconsistency on the selected pieces of legislation and harmonisation

As presented in Table 4.6, there was a weak but positive correlation between the inconsistency on the selected pieces of legislation and harmonisation ($(r)(60) = 0.269$, $p=0.038$).

It is expected that if there are inconsistencies on the existing legislation, harmonisation on areas of concern should be employed where necessary. In this study, more than 55% from all spheres of government indicated that harmonisation must be considered on the selected pieces of legislation. For an example, relevant provisions of the APA, NEMBA and PIA on importation of plants, plant products and other regulated articles.

4.7.9.2 Inconsistency amongst selected pieces of legislation and cross referencing

Table 4.6 shows a positive correlation between inconsistency issues amongst selected pieces of legislation and cross referencing amongst legislation. There was a positive correlation which was significant ($(r)(60) = 0.0333$, $p=0.009$). In cases where there is inconsistency amongst the legislation, especially on import of plants, plant products and other regulated articles, cross referencing is expected to be established through legislative instruments.

4.7.9.3 Overlapping issues on the selected pieces of legislation and need for harmonisation on the areas of concern

Table 4.6 shows the correlation between overlapping issues on the selected pieces of legislation and need for harmonisation on the areas of concern. The findings indicate that the relationship was positively strong ($(r)(60) = 0.393$, $p=0.002$). It implies that where there are overlapping legislation related issues, this can be addressed through policy and legislative parameters. As indicated in Table 4.6, the findings indicate that there is a need for harmonisation on specific sections of the legislation to improve efficiency.

Table 4. 6: Spearman's correlation coefficients on the strength of the existing legislation related to the plant health system of South Africa (n=60)

Variables	Harmonisation on the sections dealing with concurrent issues	Cross referencing on selected legislation
Inconsistency on the selected legislation.	0.269*	0.333**
Overlapping or Cross cutting issues on the selected legislation.	0.393**	0.143 ^{NS}

Correlations are highly significantly at $p < 0.01$ (**), significant (*) at $p < 0.05$ or non-significant (NS)

4.7.9.4 The Agricultural Pests Act, 1983 (APA) and overlapping issues with other legislation

The correlation between the APA and overlapping issues with other legislation is presented in Table 4.7. It was found that correlation did exist between these two variables although it is not strong ($(r)(60) = 0.108$, $p = 0.128$). However, these results suggest that the overlapping issues from the APA affecting other legislation are at a very limited level which can be easily addressed.

4.7.9.5 The APA and NEMBA on overlapping issues

As shown in Table 4.7, there was a positive correlation between the APA and NEMBA in relation to overlapping issues ((r)(60)= 0.163, p=0.213)). As there are interesting issues between the APA and NEMBA, it is therefore important to examine their relationship again. Similarly, overlapping areas do exist and the connection thereof does exist although the relationship was not significant. Other pieces of legislation are also important in this study. According to the respondents the overlapping issues include: importation of biological control agents, importation of invasive species and risk assessment, and national control of the *Bactrocera invadens*, currently called *Bactrocera dorsalis*, which is listed in terms of the APA (RSA, 2017) and NEMBA (2016) as a quarantine pest and invasive species respectively.

Table 4. 7: Spearman’s correlation coefficients on selected legislation related to the plant health system of South Africa (n=60)

Variables	Overlapping issues on selected legislation	Participation in relevant forums	Providing relevant advice to famers
APA	0.198 ^{NS}	0.335 ^{**}	0.370 ^{**}
PIA	0.243 ^{NS}	0.298 [*]	0.355 ^{**}
GMO	0.289 [*]	0.354 ^{**}	0.220 ^{NS}
PBRA	0.343 ^{**}	0.287 [*]	0.006 ^{NS}
NEMBA	0.163 ^{NS}	0.171 ^{NS}	0.079 ^{NS}
Act 36 of 1947	0.056 ^{NS}	0.215 ^{NS}	0.074 ^{NS}

Correlations are highly significantly at p<0.01 (**), significant (*) at p<0.05 or non-significant (NS)

4.7.9.6 The APA and knowledge of plant health system

Table 4.8 indicates that a strong and positive correlation between those who are aware of the APA and their level of knowledge and understanding of plant health system exist ((r)(60) =0.601, p=0.000). This implies that knowledge on APA has a positive impact towards knowledge of the plant health system in South Africa.

4.7.9.7 The APA and understanding and knowledge on relevant national legislation

Similarly, the correlation between APA and understanding and knowledge on other relevant national legislation presented in Table 4.8 was found to be strongly $((r)(60)=0.705, p=0.000)$. In this regard, it is clear that officials who operate within the context of the APA are more knowledgeable to the relevant national legislation such as the PIA, GMO, PBRA, NEMBA, and Act 36 of 1947.

4.7.9.8 Correlation between the selected pieces of national legislation

The results of the correlation between the NEMBA and knowledge and understanding on relevant national legislation are presented in Table 4.8. There was a strong positive correlation between the two variables, which was highly significant $((r)(60)=0.572, p=0.000)$.

In terms of knowledge and understanding of the national legislation, the APA is the most correlated and highly significant, $((r)(60)=0.705, p=0.000)$, followed by the NEMBA and the rest (Table 4.7). This is because the legislation in question are closely interlinked in one way or the other especially on the provision of import of plants, plant products and other regulated articles (RSA, 2014). This was proven in terms of the “integrated import permit system” under the NEMBA draft regulations which cross-referenced the APA and PIA as other applicable or relevant legislation (NEMBA, 2004). In addition, the APA and NEMBA are interlinked with respect to the biological control agents (Alberts & Moolman, 2013). It is important that legislation which is found to be interlinked is treated with caution to ensure that proper cross referencing is applied.

Table 4. 8: Spearman's correlation coefficients on linkages of the linkages of the legislative framework (n=60).

Variables	Knowledge and understanding of plant health system	Understanding and knowledge on relevant national legislation	Understanding and knowledge on international prescripts	Provision of inputs on policy issues
APA	0.601**	0.705**	0.522**	0.464**
PIA	0.455**	0.508**	0.336**	0.335**
GMO	0.472**	0.396**	0.314**	0.394**
PBRA	0.489**	0.440**	0.422**	0.570**
NEMBA	0.430**	0.572**	0.564**	0.544**
Act 36 of 1947	0.352**	0.363**	0.311*	0.503**

Correlations are highly significantly at $p < 0.01$ (**), significant (*) at $p < 0.05$ or non-significant (NS)

4.8 Conclusions

The current study found that there was a lack of knowledge on plant health matters at the PDAs. However, the majority of the respondents suggested that the knowledge gap issue can be addressed by providing basic training on quarantine pests. In terms of institutional arrangements, the study established that there is no specialised plant health unit at provincial level, therefore the need for establishment of the plant health unit at the PDAs. Nevertheless, the results found that the plant health of South Africa is effective at the national level although the provincial wing still experiences challenges. With respect to the legislative framework to control plant pests and diseases, the findings indicate that there is a need for harmonisation to address overlapping and inconsistency provisions, especially between the APA and NEMBA.

Moreover, considering that the findings are analysed and interpreted and/or discussed accordingly, the general conclusions and recommendations for this study will be discussed in the Chapter 5, which is the next Chapter.

CHAPTER 5

5.0 GENERAL CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The present study was the first to be conducted to investigate the knowledge gap within the spheres of government on plant health system, the linkages of selected pieces of legislation and spheres of government on plant health system of South Africa. The aim of this study was to improve and strengthen current plant health system of South Africa in order to improve the current system to facilitate trade and production to ensure food security. This section covers the major findings of the study, conclusions and recommendations.

5.2 Major results of the study

The findings of this study in terms of demographic groups suggested that most of the respondents (46.7%) at the provincial level are older (46-55 yrs) as compared to those working at the national department 46.7%, who are between the ages of 36-45. Most of the officials from national (33.3%) and PDAs (96.7%) are scientists and/or agricultural advisors respectively. Regarding qualifications, the study revealed that 53% from national and 73.3% PDAs possess postgraduate degrees in the agriculture field. The most experienced officials were found to be at the PDAs (50%) (16 to 20)) as compared to those from the national level, which was less than 40% (2 to 15).

In terms of knowledge, the results of the study found that more than 70% of the respondents from national departments had knowledge on plant health matters as compared to officials at the PDAs (less than 50%). Furthermore, the study revealed that 50% and 20% of the respondents from the national and PDAs did receive basic training on quarantine pests respectively. Similarly, 53.3% of the national respondents and only 20% of the PDAs respondents indicated that they do provide inputs on policy issues.

The study further discovered that 86.7 % of the national respondents and 40% of the PDAs respondents believed that the plant health system of South Africa linked well with other authorities. However, 80% of the national respondents suggested that formal linkages did exist. This was disputed by the PDAs respondents (70%) who believed that formal linkages do not exist. In accordance the report of Hanyani-Mlambo (2002), there might be a misunderstanding between formal and informal linkages. Respondents only specified the linkages between the DAFF and ARC, industry and DEA. None of the respondents managed to reveal any formal linkages with the provinces. In terms of the existence of the plant unit within the spheres of government, 76.7% of the national respondents and only 33.3 % indicated that plant health units do exist within their organisation. On the question of whether this unit should be established within the provincial level, 90% and 80% of the national and PDAs respondents respectively cited that the plant health unit must be established at provincial level.

The study also found that 66.7% of the PDAs respondents were not participating in the relevant plant health forums whereas only 43.3% of national respondents were not participating. The majority of national (83.3%) and PDAs (70%) respondents cited the need to participate in the relevant plant health fora. In terms of budget centralisation or allocation, 66.7% of the national respondents and 80% of the PDAs respondents believed that the budget for pest control and management is not sufficient and not centralised. Most of the respondents, national (50%) and PDAs (63.3%) also indicated that there were no existing and effective cooperatives or collaboration models between the DAFF and other role-players.

In terms of the legislative framework, the findings indicate that a majority of officials (more than 60%) from all spheres of government are aware of the selected pieces of legislation (APA, PIA, GMO, PBRA, Act 36 of 1947, and NEMBA). According to the respondents, the NEMBA (93.3%) and APA (90%) appear to be popular among the national respondents while PIA (76.7%) and GMO (73.3%) are popular at the provincial level. The study further discovered that the majority of respondents at national 70% and 73.3% PDAs believed that there was no cross referencing

amongst the legislation. Therefore, most of the respondents from the national and provincial authorities suggested that harmonisation is critical among selected pieces of legislation.

Institutional and legislative framework was also discussed. The findings show that there was an inverse correlation between education and provision of inputs on policy issues which was non-significant ($r(60) = -0.132$, $P = 0.316$). Furthermore, the findings show that there was a positive association ($r(60) = 0.466$, $p = 0.000$) between basic training on quarantine pests and the level of providing inputs on policy issues. Place of employment and knowledge of plant health system was also determined. There was a positive relationship between place of employment and knowledge and understanding of plant health system of South Africa, which was statistically significant ($r(60) = 0.404$, $p = 0.001$).

Likewise, the results of the correlation between the availability of plant health unit within the spheres of government and the provision of inputs on policy issues relating to plant health was also determined. The correlation was strongly positive between these two variables which was highly significant ($r(60) = 0.600$, $p = 0.000$). Furthermore, the correlation between overlapping issues on the selected pieces of legislation and need for harmonisation on the areas of concern was examined. The findings indicate that the relationship was positively strong which was significant ($r(60) = 0.393$, $p = 0.002$).

5.3 Conclusions

An effective plant health system is critical for the proper execution and implementation of the plant health legislative framework. This research study identified knowledge gaps on the current system, which needs to be improved and strengthened for efficiency and effective plant health system. The study further revealed that the plant health system at the national level is sound contrary to the structure at provincial level.

In terms of the knowledge and understanding on plant health matters, it can be concluded that there are knowledge gaps on plant health matters especially at provincial level. Factors influencing the level of knowledge in this study were found to be: (1) Lack of exposure to the nature of the work (2) Lack of relevant basic trainings (3) Lack of participation in the relevant forums and (4) Receiving continuous awareness and promotion on plant health matters. As has already been indicated, the National Authority (DAFF: NPPOZA and DEA) did not appear to have shortcomings in terms of knowledge gaps because there are valuable tools at national authority to ensure coherence.

Knowledge and understanding on plant health system and legislative framework was deemed to be critical at all spheres of government for the control and management of plant pests and diseases. This will assist the government officials at all levels to provide updated and reliable information to all categories of farmers, importers and exporters. The plant health regulatory framework is therefore necessary for sustainable agriculture, production and safe trade against quarantine pests.

Regarding the institutional arrangement on plant health system, the competent structure is well established at the national authority as opposed to the provincial structure. However, the study established that there are no formal linkages which are policy and legislative based between the national authority and PDAs. At provincial level, the study found that there were no specialised plant health units with the necessary capacity and required resources for control and management of regulated pests. In addition, the study finds that there are linkages between the NPPOZA and the research institutes although they may need to be revived to provide for extensive scope of plant health matters. DAFF and DEA were found to be linked through MOU. Within all spheres of government, budgetary issues and collaboration among the various stakeholders were found to be a challenge in pest control.

The study further examined the relationship in relation to relevant pieces of legislation impacting on the phytosanitary regulatory environment. The study established that there are cross-cutting or overlapping issues among legislation such as the NEMBA and APA as well as PIA. This was found to appear on import

provision relating to plants, plant products and other regulated articles. For instance, the importation of biological control agents is covered in terms of the APA and the NEMBA. The study found that the relevant pieces of legislation do not provide for a cross referencing clause. This study proved that plant health matters including regulatory aspects are administered at national authority.

5.4 Recommendations

The recommendations provided are based on the objectives of this study in relation to the relevant department.

The first objective was to identify the existing knowledge gaps in phytosanitary matters at both the national and provincial levels within the agricultural field. Findings from the study revealed that knowledge gaps on plant health issues exist and therefore the following are recommended:

- The NPPOZA and/or DAFF should provide the necessary basic trainings on plant health matters at provincial level for capacity building to ensure rapid response to outbreaks of quarantine pests and to enable provincial authorities to provide proper and updated advice to farmers.
- The NPPOZA and/or DAFF should involve relevant PDAs officials to actively participate in relevant plant health fora.
- The NPPOZA and/or DAFF should intensify awareness and promotion at all spheres of government on plant health matters.

The second objective was to identify critical areas and gaps to be addressed in the current institutional framework of national and provincial departments of agriculture and the following are recommended:

- The DAFF and PDAs should establish of formal linkages based on policy and legislative framework on phytosanitary matters. It is recommended that national authorities and provincial structures should be formally linked to ensure that the plant health mandate is executed as well as proper allocation

of the resources. In the interim, the linkages may be done through relevant agreements or memorandum of understanding whilst in the long term policy and legislative instruments should be developed to spell out the responsibilities and roles.

- The DAFF should establish collaboration or cooperative models on plant health matters involving all relevant stakeholders, such as commodity groups, PDAs, Universities and research institutes. For example, through such collaboration, universities may be able to play a meaningful role in pest identification and publishing new research findings.
- The PDAs should establish plant health units at provincial level and the DAFF should transfer some of the mandate to provincial authorities such as surveillance, awareness and promotion and possible plant health diagnostic services.
- The DAFF should allocate sufficient budget for plant pest control and management within its relevant branch structures at, which is outside the scope of the Disaster Management Funds. More funds should be allocated for operational activities for rapid response for pest outbreaks.

The third objective was to identify the limitations and risks in the existing or current legislation on phytosanitary matters and the following recommendation is made:

- The DAFF and DEA should harmonise sections or provisions of the APA & NEMBA which were found to have overlapping issues especially on the provisions for importation of plants, plant products and other regulated articles and to ensure that proper cross referencing is legislated to enhance service delivery and improve regulatory systems.

5.5 Future prospects.

In terms of future prospects of research: It is important that further investigation is conducted to get the perspective of the farmers, local extension officers, universities, research institutes and commodity groups on plant health system to ensure full participation in agricultural production, agricultural export markets and trade in general.

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APPENDICES

APPENDIX 1: QUESTIONNAIRE

1. INTRODUCTION

My name is Mr Maanda Rambauli. I have registered for the Master of Science in Agriculture. I am conducting this research at the University of South Africa (UNISA). The research aimed at collecting information on the plant health system within the spheres of government of South Africa. It will also focus on the linkages of selected pieces of legislation as well as the institutional framework on plant health matters with the aim of proposing appropriate recommendations to the policy makers within the spheres of government in order to improve and strengthen the regulatory system in South Africa.

In order to gather relevant and representative data, I would like to take this opportunity out of your busy schedule and ask you few questions to determine the effectiveness and efficiency of the current plant health system by means of obtaining response from you. This process should take approximately 60 minutes.

2. SECTIONS

The questionnaire is consists of the following:

PART A: Biographic information of respondents

PART B: questionnaire to rate the level of your knowledge and understanding of the existing plant health systems

PART C: questionnaire to determine the existing institutional arrangements on the plant health system within the spheres of government

PART D: questionnaire on the determination of the understanding and effectiveness of the linkages of the selected pieces of legislation in relation to plant health system

3. INSTRUCTIONS

3.1 please go through various parts of this document, carefully and provide the following where relevant:

3.1.1 Mark with your choice with an X in the relevant use boxes

3.1.2 Use the rating system as indicated below and provide your answers in various sections

3.1.3 The information provided will be treated confidential and will be solely used for the purpose of this research.

4. PART A: BIOGRAPHIC INFORMATION: please complete the following:

4.1 Age

Age	20-35	36-45	46-55

4.2 Gender

Male	Female

4.3 Home language

English	Venda	Zulu	Tsonga	Tswana	Xhosa	Sotho	Pedi	Afrikaans	Other (specify)

4.4 Highest education level

	Qualifications	Years of educational level e.g. 3 years
	Post graduate degree	
	Degree	
	Diploma	
	Other, specify	

If other, please specify: _____

4.5 Place of employment

National Department	Provincial Department of Agriculture	Research Institution

Please specify e.g. DAFF: _____

4.6 Designation

Please, specify:

4.7 Experience in Agricultural environment

2- 5 years	6 – 10 years	11- 15 years	16 and above years

5. PART B: KNOWLEDGE OF PLANT HEALTH SYSTEM IN SOUTH AFRICA

5.1 Do you have relevant knowledge and understanding of the plant health system of South Africa in relation to trade and production?

Yes		No	
-----	--	----	--

If yes, indicate any element of plant health system of South Africa:

5.2 Does the level of your knowledge on plant health matters at the provincial level disadvantage the small scale and emerging farmers to fully participate in horticultural produce?

Yes		No	
-----	--	----	--

5.3 Are the following terminologies differ: plant health system and phytosanitary system?

Yes		No	
-----	--	----	--

5.4 Do you have an understanding and knowledge of the relevant international prescripts related to plant health systems?

Yes		No	
-----	--	----	--

5.5 Do you have an understanding and knowledge of the relevant national prescripts and policy on plant health system?

Yes		No	
-----	--	----	--

5.6 Does the scope of the plant health system provides for the control of the introduction and spread of regulated pests as well as pests of national concern?

Yes		No	
-----	--	----	--

5.7 Does national legislation of the South African plant health matters provides for import, national?

Yes		No	
-----	--	----	--

5.8 Do relevant basic trainings on quarantine pests and diseases as well as on plant health system conducted in your institution for capacity building?

Yes		No	
-----	--	----	--

If yes, what type/s of training, please specify:

5.9 Do you often provide inputs during the development of policies and legislation relating to plant health regulatory systems in the country?

Yes		No	
-----	--	----	--

6. PART C: INSTITUTIONAL ARRANGEMENTS ON THE PLANT HEALTH SYSTEMS

6.1 Do you fully understand the nature of the plant health system in South Africa?

Yes		No	
-----	--	----	--

6.2 Do you understand the existing linkages of the international framework and national framework on plant health matters?

Yes		No	
-----	--	----	--

6.3 The appropriate linkages with various national authorities emanated from the WTO SPS agreement, IPPC and NPPOZA.

Yes		No	
-----	--	----	--

6.4 Is there an effective formal linkage on plant health matters between NPPOZA and your organisation/department/institution?

Yes		No	
-----	--	----	--

6.5 Are you aware of the existing formal institutional framework dealing with plant health matters in your organisation?

Yes		No	
-----	--	----	--

6.6 Are plant health matters or phytosanitary matters administered only at the national level to facilitate trade?

Yes		No	
-----	--	----	--

6.7 Is South African plant health system well linked with relevant research institutes for the identification of pests and disease?

Yes		No	
-----	--	----	--

If yes, please indicate:

6.8 Are there existing linkages between the research institutes and government in assisting farmers on new innovation to ensure high level of productivity through effective control of pests and diseases?

Yes		No	
-----	--	----	--

6.9 Is there a need for the establishment of the provincial unit dealing with a specific plant health matters at provincial level?

Yes		No	
-----	--	----	--

6.10 Are all farmers and potential farmers able to access advisory services on plant health matters in relation to trade across all spheres of government?

Yes		No	
-----	--	----	--

6.11 Have farmers ever requested such plant health information?

Yes		No	
-----	--	----	--

6.12 Do you understand the linkages of the plant health system of South Africa with other relevant national authority/ organisation such as DAFF/DEA/ARC/Provincial authority?

Yes		No	
-----	--	----	--

6.13 Do you participate in the relevant fora (forums) relating to plant pests and disease control affecting domestic and international trade?

Yes		No	
-----	--	----	--

If no, would you like to participate in such fora/forums/meetings in future?

Yes		No	
-----	--	----	--

6.14 Is there sufficient centralised budget in contributing towards controlling plant pests and disease of economic concern?

Yes		No	
-----	--	----	--

Please, comment:

6.15 Are there existing cooperative or collaborative models in South Africa to assist farmers in combating pests and diseases within the spheres of government?

Yes		No	
-----	--	----	--

If yes, please indicate:

7. PART D: LINKAGES OF THE SELECTED PIECES OF LEGISLATION

7.1 Are you aware of the Agricultural Pests Act, 1983 (Act No.36 of 1983) (APA) and its purpose as well as the benefits to South African economy?

Yes		No	
-----	--	----	--

7.2 Is South African plant health system linked with Agricultural Pests Act, 1983 (Act No.36 of 1983) and associated regulations.

Yes		No	
-----	--	----	--

7.3 Are you aware of the relevant pieces of national legislation to be considered in terms of the plant health environment or system, which include?

7.3.1 Agricultural Pests Act, 1983 (Act No.36 of 1983)

Yes		No	
-----	--	----	--

7.3.2 Plant Improvement Act, 1976 (Act No. 53 of 1976)

Yes		No	
-----	--	----	--

7.3.4 Genetically Modified Organisms Act, 1997 (Act No. 15 of 1997)

Yes		No	
-----	--	----	--

7.3.5 Plant Breeders' Rights Act, 1976 (Act No. 15 of 1976)

Yes		No	
-----	--	----	--

7.3.6 National Environmental Management Biodiversity Act, 2004 (Act No.10 of 2004)

Yes		No	
-----	--	----	--

7.3.7 Fertilizers, Farm Feed, Agricultural Remedies and Stock Remedies Act, 1947 (Act No. 36 of 1947)

Yes		No	
-----	--	----	--

7.4 Are there some overlaps/cross-cutting issues within various organisation/departments which you are aware of, on the existing legislation in relation to plant pests and diseases control?

Yes		No	
-----	--	----	--

If yes, which ones are those, please indicate:

7.5 Does the power to enforce the Agricultural Pests Act is vested within the national and provincial government?

Yes		No	
-----	--	----	--

7.6 Is there a need in South Africa to transfer certain functions and power to other authority in controlling pests and disease in terms of the Agriculture Pests Act?

Yes		No	
-----	--	----	--

If yes, please explain your response:

7.7 Do you always consult relevant legislation to advise farmers or stakeholders on plant health system in terms of relevant prescripts?

Yes		No	
-----	--	----	--

7.8 Is there a clear links or cross referencing amongst relevant pieces of legislation?

Yes		No	
-----	--	----	--

If yes, please indicate:

7.9 Are there any legislation or by-laws other than Agricultural Pests Act dealing with plant pests and diseases of quarantine concern?

Yes		No	
-----	--	----	--

If yes, please indicate:

7.10 are there inconsistency in the selected pieces of legislation affecting the plant health system which ultimately have impact on production, domestic and international trade on horticultural produce?

Yes		No	
-----	--	----	--

If yes, please indicate:

7.11 Is there a need to harmonise all related sections dealing with matters of concurrency especially on import procedures within the scope of relevant legislation for efficiency purposes?

Yes		No	
-----	--	----	--

If yes, please indicate why:

7.12 Are you aware of the legislation and import provisions on plant health system affecting other relevant legislation?

Yes		No	
-----	--	----	--

APPENDIX 2: PARTICIPANT INFORMATION SHEET

PARTICIPANT INFORMATION SHEET

Ethics clearance reference number: 2016/CAES/069

Research permission reference number:

17 August 2016

Title: Evaluation study on linkages of selected pieces of legislation and spheres of government on plant health systems in South Africa

Dear Prospective Participant

I, Maanda Rambauli am doing research with FN Mudau, a Professor in the Department of Agriculture and Animal Health towards a MSc in Agriculture at the University of South Africa. We are inviting you to participate in a study entitled “evaluation study on linkages of selected pieces of legislation and spheres of government on plant health systems in South Africa”.

WHAT IS THE PURPOSE OF THE STUDY?

I am conducting this research to find out the effectiveness and strength of current plant health system, legislative and Institutional framework. The study also seeks to identify areas to be improved for:

- Sustainable horticultural production at all levels for food security and trade
- Sustainable trade: domestic and international
- Establishment of effective and legitimate linkages and working relations within the sphere of government
- Harmonisation of relevant pieces of legislation dealing with concurrent issues.

WHY AM I BEING INVITED TO PARTICIPATE?

You are being invited to participate based on the following:

- Expertise on the subject matters,
- Work experience in this experience,
- Nature of the work in relation to the subject matters
- Relevant department or institution

I have obtained your contact details from the database of the Department of Agriculture, Forestry and Fisheries (DAFF) and through my previous networking interaction with your institution as a relevant stakeholder. I am currently working for the DAFF.

The total of 130 people, 10 from each institution will be requested to complete the questionnaire. Representations in terms of sample group are considered because they should have extensive relevant knowledge and experience in the field in question, especially those who are functioning within the administration, application, implementation and enforcement of plant related strategies, programmes, legislation and policy.

WHAT IS THE NATURE OF MY PARTICIPATION IN THIS STUDY?

The study involves semi-structured questionnaire which will be both the qualitative and quantitative research to the focus group. Participants will be asked same question at their different location and it will be classified as confidential to ensure credibility.

All participants will be required to complete the questionnaire and forward the completed questionnaire via the e-mail or any other feasible means of communication. Those who will be directly interviewed (personal interviewed) based on the scheduled appointments will be required to complete and hand the response within a day.

Regarding the questions to be asked these will include relevant questions on (please see attached questionnaire):

- biographic information
- knowledge and understanding of the existing plant health system
- the existing institutional arrangements on the plant health system within the spheres of government
- the understanding and effectiveness of the linkages of the selected pieces of legislation in relation to plant health.

The duration of the individual interviews will last about 45 minutes whereas the completion of the questionnaire will take about 60 minutes.

CAN I WITHDRAW FROM THIS STUDY EVEN AFTER HAVING AGREED TO PARTICIPATE?

Participating in this study is voluntary and you are under no obligation to consent to participation. If you do decide to take part, you will be given this information sheet to keep

and be asked to sign a written consent form. You are free to withdraw at any time and without giving a reason.

However, once the questionnaire have been submitted, it will not be possible to withdraw once they have submitted the questionnaire as this will defeat the purpose of the study.

WHAT ARE THE POTENTIAL BENEFITS OF TAKING PART IN THIS STUDY?

Participation in this study will possible draw your attention on the importance of the plant health matters in relation to prevention and control of plant pests and diseases in order to effectively participate in policy formulation and decision making processes in relation to plant health measures.

The overall benefits of the study are:

- Enables relevant government departments within the spheres of government to make relevant recommendations on policy issues relating to effective regulatory system.
- Provide and propose for appropriate institutional and legislative linkages within the spheres of government
- Identify existing knowledge gaps within the sphere of government on plant health issues and propose appropriate intervention to overcome these challenges.
- Provide a mechanism in which the provincial governments are able to assist the small-scale farmers in providing the basic advisory services on plant health issues pertaining to domestic and international trade
- Provide for appropriate collaborative and coordinating approach to assist spheres of government provincial to effectively combat the spread of plant pests and diseases within the Republic
- To provide for effective mechanisms to utilize the available resources in controlling plant pests and diseases
- Provide for essential element to link the research findings on plant health matters with relevant authority
- Make provisions for effective and efficient awareness and promotion within the spheres of government on plant health matters
- The above will directly support relevant government policies and priorities which contribute in supporting:
 - Economic growth and rural development
 - Food production and security

- Job creation
- Poverty elevation

ARE THERE ANY NEGATIVE CONSEQUENCES FOR ME IF I PARTICIPATE IN THE RESEARCH PROJECT?

There are no foreseen negative consequences or risk relating to this study as this is about completion of the questionnaire.

WILL THE INFORMATION THAT I CONVEY TO THE RESEARCHER AND MY IDENTITY BE KEPT CONFIDENTIAL?

Your answers will be given a code number or a pseudonym and you will be referred to in this way in the data, any publications, or other research reporting methods such as conference proceedings.

The data will only be accessed by those involved in the study (supervisor and myself) and there is any other person to be involved.

The anonymous data may be used for other purposes, such as a research report, journal articles as well as conference proceedings. The report of the study may be submitted for publication, but individual participants will not be identifiable in such a report.

While every effort will be made by the researcher to ensure that you will not be connected to the information that you share during the focus group, I cannot guarantee that other participants in the focus group will treat information confidentially. I shall, however, encourage all participants to do so. For this reason I advise you not to disclose personally sensitive information in the focus group.

HOW WILL THE RESEARCHER(S) PROTECT THE SECURITY OF DATA?

Hard copies of your answers will be stored by the researcher for a period of five years in a locked cupboard/filing cabinet in the office: Pretoria for the purpose of future research or academic purposes; electronic information will be stored on a password protected computer. Hard copies will be shredded and/or electronic copies will be permanently deleted from the hard drive of the computer through the use of a relevant software programme.

WILL I RECEIVE PAYMENT OR ANY INCENTIVES FOR PARTICIPATING IN THIS STUDY?

There are no financial benefits to participants as this is a voluntary activity and there will be no any legal implications thereof.

HAS THE STUDY RECEIVED ETHICS APPROVAL

The study has obtained Ethics approval from CAES Research Ethics Review Committee.
Ref: 2006/CAES/069

A copy of the approval letter can be obtained from the researcher if you so wish.

HOW WILL I BE INFORMED OF THE FINDINGS/RESULTS OF THE RESEARCH?

If you would like to be informed of the final research findings, please contact Mr Maanda Rambauli on cell: 061 768 5630, email: mrrambauli@gmail.com. The findings are accessible after the completion of the study which is deemed to be completed in the year 2017.

Should you require any further information or want to contact the researcher about any aspect of this study, please contact Prof. F. N Mudau contact details, e-mail: mudaufn@unisa.ac.za, cell: 0829405150.

Should you have concerns about the way in which the research has been conducted, you may contact Prof. F. N Mudau contact details, e-mail: mudaufn@unisa.ac.za, cell: 0829405150.

Contact the research ethics chairperson of the CAES Research Ethics Review Committee, Prof. EL Kempen, email: kempeel@unisa.ac.za; Tel: +27 11 471 2241, if you have any ethical concerns.

Thank you for taking time to read this information sheet and for participating in this study.

Thank you.

Mr M Rambauli

APPENDIX 3: CONSENT FORM AND PERMISSION LETTER

CONSENT TO PARTICIPATE IN THIS STUDY

I, _____ (participant name), confirm that the person asking my consent to take part in this research has told me about the nature, procedure, potential benefits and anticipated inconvenience of participation.

I have read (or had explained to me) and understood the study as explained in the information sheet.

I have had sufficient opportunity to ask questions and am prepared to participate in the study.

I understand that my participation is voluntary and that I am free to withdraw at any time without penalty (if applicable).

I am aware that the findings of this study will be processed into a research report, journal publications and/or conference proceedings, but that my participation will be kept confidential unless otherwise specified.

I have received a signed copy of the informed consent agreement.

Participant Name & Surname..... (please print)

Participant Signature.....Date.....

Researcher's Name & Surname Mr Maanda Rambauli

Researcher's signature.....Date.....

Request for permission to conduct a study/ research in your department or organisation

Title: Evaluation study on linkages of selected pieces of legislation and spheres of government on plant health system in South Africa

Dear Participants

I, Maanda Rambauli am doing research with FN Mudau, a Professor in the Department of Agriculture and Animal Health towards a MSc in Agriculture at the University of South Africa. I am an employee of the Department of Agriculture, Forestry and Fisheries (DAFF) and I am conducting this study on my personal capacity.

We are inviting you to participate in a study entitled “evaluation study on linkages of selected pieces of legislation and spheres of government on plant health systems in South Africa”.

The aim of the study is to:

- (i) Investigate the effectiveness and strength of :
 - Current plant health system
 - Institutional arrangement
- (ii) Identify areas to be improved for:
 - Sustainable horticultural production at all levels for food security and trade
 - Sustainable trade: domestic and international
 - Establishment of effective and legitimate linkages and working relations within the sphere of government
 - Harmonisation of relevant pieces of legislation dealing with concurrent issues.

Your department/organisation has been selected because of the nature of your mandate which are affected by the regulatory system on plant health issues such as the prevention and control of the introduction and spread of plant pests and diseases.

The study will entail both qualitative and quantitative approach by means of designing questionnaire which will be distributed directly to the main role-players via electronic mail (e-mail) and where possible face to face interview to be conducted.

The questionnaire will be designed to gather information on relevant legislation, quarantine pests, institutional framework institutional framework, biographical information and academic background. Your department/organisation will be required/ requested to participate in order to assist or support this study through completing questionnaire. The participants should be above 23 years with more than 2 years of work experience in the field of Plant production or crop protection/horticulture/ biosecurity and related field.

The benefits of this study are to:

- Enables relevant government departments within the spheres of government to make relevant recommendations on policy issues relating to effective regulatory system
- Provide and propose for appropriate institutional and legislative linkages within the spheres of government
- Identify existing knowledge gaps within the sphere of government on plant health issues and propose appropriate intervention to overcome these challenges
- Provide a mechanism in which the provincial governments are able to assist the small-scale farmers in providing the basic advisory services on plant health issues pertaining to domestic and international trade
- Provide for appropriate collaborative and coordinating approach to assist spheres of government to effectively combat the spread of plant pests and diseases within the Republic
- To provide for effective mechanisms to utilize the available resources in controlling plant pests and diseases
- Provide for essential element to link the research findings on plant health matters with relevant authority or community
- Make provisions for effective and efficient awareness and promotion within the spheres of government on plant health matters
- The above will directly support relevant government policies and priorities which contribute in supporting:
 - Economic growth and rural development
 - Food production and security
 - Job creation
 - Poverty elevation.

There are no potential risks envisaged.

Feedback procedure will entail provision of the findings of the research through dissertation as well as relevant publications.

Yours sincerely



Mr M Rambauli

Researcher/University of South Africa

061 768 5630

MaandaR@daff.gov.za or Mrrambauli@gmail.com

APPENDIX 4: ETHICS APPROVAL

CAES RESEARCH ETHICS REVIEW COMMITTEE
National Health Research Ethics Council Registration no: REC-170616-051

Date: 19/09/2016

Ref #: **2016/CAES/069**
Name of applicant: **Mr M Rambauli**
Student #: **58526080**

Dear Mr Rambauli,

Decision: Ethics Approval

Proposal: Evaluation study on linkages of selected pieces of legislation and spheres of government on plant health systems in South Africa

Supervisor: Prof FN Mudau

Qualification: Postgraduate degree

Thank you for the application for research ethics clearance by the CAES Research Ethics Review Committee for the above mentioned research. Approval is granted for the project.

Please note that the approval is valid for a one year period only. After one year the researcher is required to submit a progress report, upon which the ethics clearance may be renewed for another year.

Due date for progress report: 30 September 2017

The application was reviewed in compliance with the Unisa Policy on Research Ethics by the CAES Research Ethics Review Committee on 09 September 2016.

The proposed research may now commence with the proviso that:

- 1) The researcher/s will ensure that the research project adheres to the values and principles expressed in the UNISA Policy on Research Ethics.*
- 2) Any adverse circumstance arising in the undertaking of the research project that is relevant to the ethicality of the study, as well as changes in the methodology, should*



be communicated in writing to the CAES Research Ethics Review Committee. An amended application could be requested if there are substantial changes from the existing proposal, especially if those changes affect any of the study-related risks for the research participants.

- 3) *The researcher will ensure that the research project adheres to any applicable national legislation, professional codes of conduct, institutional guidelines and scientific standards relevant to the specific field of study.*

Note:

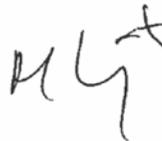
The reference number [top right corner of this communiqué] should be clearly indicated on all forms of communication [e.g. Webmail, E-mail messages, letters] with the intended research participants, as well as with the CAES RERC.

Kind regards,



Signature

CAES RERC Chair: Prof EL Kempen



Signature

CAES Executive Dean: Prof MJ Linington

Approval template 2014

University of South Africa
Preller Street, Muckleneuk Ridge, City of Tshwane
PO Box 392 UNISA 0003 South Africa
Telephone: +27 12 429 3111 Facsimile: +27 12 429 4150
www.unisa.ac.za