

NATIONAL HORTICULTURE POLICY AND STRATEGIC IMPLEMENTATION PLAN

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PART 1 NATIONAL HORTICULTURE POLICY

<u>1 INTRODUCTION</u>	<u>1</u>
1.1 BACKGROUND	1
1.2 DEFINITION OF 'HORTICULTURE'	1
1.3 IMPORTANCE OF HORTICULTURE IN RWANDA	1
1.4 OBJECTIVES OF NATIONAL HORTICULTURE POLICY.....	2
1.5 ALIGNMENT OF THE POLICY WITH OTHER NATIONAL POLICY DOCUMENTS	3
1.5.1 VISION 2020	3
1.5.2 EDPRS 2	4
1.5.3 PSTA III.....	5
1.5.4 CAADP 2.....	6
<u>2 SITUATION ANALYSIS OF THE HORTICULTURE SECTOR IN RWANDA.....</u>	<u>7</u>
2.1 DATA AVAILABILITY	7
2.2 STRUCTURE OF PRODUCTION	8
2.2.1 RWANDAN AGRICULTURE.....	8
2.2.2 HORTICULTURE PRODUCTION.....	8
2.3 ON-FARM CONSUMPTION AND USAGE	11
2.4 DOMESTIC MARKETING	12
2.5 PROCESSING	13
2.6 EXTERNAL TRADE.....	16
2.7 THE PREVALENCE AND ROLES OF HORTICULTURAL ORGANISATIONS.....	18
2.7.1 HORTICULTURE COOPERATIVES AND ASSOCIATIONS	18
2.7.2 LARGE HOLDERS.....	19
<u>3 ANALYSIS AND COMPONENTS OF NATIONAL HORTICULTURE POLICY</u>	<u>20</u>
3.1 THE PURPOSE OF ADOPTING A NATIONAL HORTICULTURE POLICY	20
3.2 DIVERSITY WITHIN THE HORTICULTURE SECTOR	20
3.3 HORTICULTURE-SECTOR SEGMENTATION AND THE FRAMEWORK FOR NATIONAL HORTICULTURAL POLICY.....	21
3.3.1 THE SEGMENTS	21
3.3.2 SHORT-TO- MEDIUM-TERM OBJECTIVES FOR THE THREE HORTICULTURE SUB-SECTORS	22
3.4 DOMESTIC DEMAND, CROSS-BORDER TRADE AND GROWTH TARGETS	23
3.5 TARGETS FOR INTERNATIONAL EXPORTS	25
3.6 THE IMPORTANCE OF SYSTEMATIC DEVELOPMENT OF CROP-SPECIFIC VALUE CHAINS	26
3.7 SUB-SECTOR WEIGHTING	26

4 HORTICULTURE SUB-SECTOR POLICIES 28

4.1 POLICIES FOR SUB-SECTOR (A): PRODUCTION FOR HOME USE AND OCCASIONAL SALE.....	28
4.1.1 STRENGTHENING TRAINING AND ADVICE	28
4.1.2 IMPROVING ACCESS TO INPUTS AND MARKETS	29
4.1.3 SUPPORT FOR HOUSEHOLD VEGETABLE GARDENS: PRODUCTION AND USAGE	29
4.2 POLICIES FOR SUB-SECTOR (B): PRODUCTION PRINCIPALLY FOR THE DOMESTIC AND REGIONAL MARKETS	30
4.2.1 DATA AVAILABILITY AND ANALYSIS	30
4.2.2 TYPES OF PRODUCERS IN SUB-SECTOR (B).....	31
4.2.3 ALTERNATIVE PRODUCTION, PROCESSING AND MARKETING MODELS.....	31
4.3 POLICIES TO DEVELOP PRODUCTION FOR SALE BEYOND THE EAST AFRICAN REGION	36
4.3.1 FACTORS AFFECTING COMPARATIVE ADVANTAGE.....	36
4.3.2 ADDRESSING CONSTRAINTS	36

5 ADDRESSING THE SHORTAGE OF DATA AND THE LACK OF NATIONAL CAPACITY TO UNDERTAKE HORTICULTURE-SECTOR POLICY ANALYSIS AND FORMULATE POLICY 42

5.1 DATA AVAILABILITY AND USE.....	42
5.1.1 PRODUCTION	42
5.1.2 ON FARM CONSUMPTION AND POST-HARVEST LOSSES.....	42
5.1.3 REGIONAL TRADE	42
5.1.4 MARKET PRICES.....	43
5.1.5 INTERNAL FLOWS OF PRODUCE	43
5.2 DEVELOPING A CAPACITY FOR HORTICULTURE POLICY ANALYSIS WITHIN NAEB.....	43

PART 2 STRATEGIC PLAN FOR IMPLEMENTATION OF THE NATIONAL HORTICULTURE POLICY

1 INTRODUCTION 44

2 OVERVIEW OF THE SECTOR 44

2.1 DEFINITION OF 'HORTICULTURE'	44
2.2 SECTOR STATUS, POTENTIAL AND CHALLENGES.....	44
2.2.1 SECTOR STATUS.....	44
2.2.2 SECTOR POTENTIAL	46
2.2.3 SECTOR CHALLENGES.....	47
2.2.4 INSTITUTIONAL OVERVIEW OF THE SECTOR.....	48

<u>3</u>	<u>THE STRATEGIC FRAMEWORK</u>	<u>49</u>
3.1	MISSION AND OBJECTIVES	49
3.1.1	MISSION	49
3.1.2	OBJECTIVES.....	49
3.2	CONTRIBUTION TO EDPRS 2 AND PSTA III	49
<u>4</u>	<u>TRANSLATING POLICY INTO ACTION.....</u>	<u>49</u>
4.1	THE COMPLEXITY OF THE HORTICULTURE SECTOR.....	49
4.2	DERIVATION OF THE LOGICAL FRAMEWORK	50
4.3	OUTPUTS AND OUTCOMES	51
4.3.1	OUTCOME 1: PROGRESSIVE INCREASE IN THE VALUE WHICH IS ADDED DOMESTICALLY WITHIN THE HORTICULTURE SECTOR AND PROGRESSIVE IMPROVEMENT IN THE EFFICIENCY OF SUCH VALUE ADDING	51
4.3.2	OUTCOME 2: PROGRESSIVE INCREASE IN THE ABILITY OF POOR HOUSEHOLDS TO ACQUIRE FRUITS AND VEGETABLES AND PROGRESSIVE IMPROVEMENT IN THE EFFICIENCY OF FRUIT AND VEGETABLE USE IN POOR HOUSEHOLDS	51
4.3.3	OUTCOME 3: ACCELERATED GROWTH IN NET EXPORT EARNINGS FROM TRADE IN FRESH AND PROCESSED HORTICULTURAL PRODUCE.....	52
4.3.4	OUTCOME 4: INCREASED NATIONAL CAPACITY TO UNDERTAKE IMPROVED HORTICULTURE-SECTOR POLICY ANALYSIS AND PLANNING.....	52
<u>5</u>	<u>IMPLEMENTATION OF THE SECTOR STRATEGIC PLAN</u>	<u>52</u>
5.1	SEQUENCING OF INTERVENTIONS	52
5.1.1	PRIORITY ACTIVITIES	52
5.1.2	SEQUENCING OF ACTIVITIES TO EXPAND INTERNATIONAL EXPORTS.....	53
5.2	ROLES AND RESPONSIBILITIES OF STAKEHOLDERS IN THE SECTOR.....	53
5.2.1	ROLES OF CENTRAL AND LOCAL GOVERNMENT	53
5.2.2	ROLE OF THE PRIVATE SECTOR	54
5.2.3	ROLE OF HORTICULTURE ORGANISATIONS.....	54
5.2.4	ROLES OF CIVIL SOCIETY AND OTHER ORGANISATIONS.....	54
5.2.5	COORDINATION OF THE ESTABLISHMENT OF NEW VALUE CHAINS.....	54
5.3	MECHANISMS FOR COORDINATION AND INFORMATION SHARING	55
<u>6</u>	<u>MONITORING AND EVALUATION</u>	<u>56</u>
<u>7</u>	<u>COSTS AND FINANCING</u>	<u>56</u>
ANNEXES	58

ACRONYMS

ALUCD	Agricultural Land Use Consolidation Decree
ASWG	Agriculture Sector Working Group
CAADP	Comprehensive Africa Agriculture Development programme
CIP	Crop Intensification Programme
COMESA	Common Market for Eastern and Southern Africa
CSVA	Comprehensive Food Security and Vulnerability Analysis and Nutrition Survey
EAC	East African Community
GDP	Gross domestic product
EDPRS	Economic Development and Poverty Reduction Strategy
EICV	Integrated Household Living Conditions Survey
GoR	Government of the Republic of Rwanda
HACCP	Hazard Analysis and Critical Control Points
HIWEG	Horticulture International Export Working Group
ICT	Information and communications technology
KLM	Royal Dutch Airlines
MINAGRI	Ministry of Agriculture and Animal Resources
MINALOC	Ministry of Local Government and Administration
MINECOFIN	Ministry of Finance and Economic Planning
MINEDUC	Ministry of Education
MININFRA	Ministry of Infrastructure
MOH	Ministry of Health
NAEB	National Agricultural Export Development Board
NAS	National Agricultural Survey
NEPAD	New Partnership for Africa's Development
NGO	Non-governmental organisation
NISR	National Institute of Statistics of Rwanda
PPP	Public Private Partnership
PSTA	Strategic Plan for the Transformation of Agriculture
RAB	Rwanda Agriculture Board
RBS	Rwanda Bureau of Standards
RHODA	Rwanda Horticulture Development Authority
RPPA	Rwanda Public Procurement Authority

PART 1

NATIONAL HORTICULTURE POLICY

1 Introduction

1.1 Background

Rwanda's climate and soils are highly suited to the production of horticultural crops and flowers. This, coupled with substantial variation in altitude across the country, means that there is potential to cultivate a wide range of high quality fruits, vegetables and flowers and for growers to obtain high per-hectare yields. Rwanda's current output ranges from tropical crops, such as mangoes, pineapples and bananas, to crops which thrive in temperate climates, such as carrots, cabbages, and roses. Horticulture and floriculture production is labour intensive and generates a high level of value added per hectare. Therefore, it is ideally suited to the rural situation in Rwanda, where labour is abundant and land is of high quality but scarce.

This physical potential for horticulture and floriculture has yet to be exploited systematically. The yields obtained per hectare are well below those which could be achieved and a high proportion of production is thought to be lost after harvest or is not harvested because there is no ready market.

1.2 Definition of 'horticulture'

For the purpose of this policy, 'horticulture' is defined as covering (a) fruits, including fruit bananas but excluding all other bananas, (b) vegetables, excluding Irish potatoes, (c) cut flowers (both summer flowers and exotic flowers including roses), (d) plants grown for the extraction of essential oils, other than pyrethrum, and (e) macadamia nuts.

1.3 Importance of horticulture in Rwanda

In 2013 agriculture accounted for approximately one third of Rwanda's GDP.¹ The majority of the country's labour force is engaged mainly in subsistence agriculture. Small-scale farming remains the main source of livelihood for most households.

Horticulture accounted for an estimated 3.2 percent of 2013 national GDP and 9.7 percent of agricultural GDP (Table 1). This is despite the fact that the production of fruits and vegetables occupied only an estimated 6.4 percent of the country's cultivated land.

It is thought that up to one million rural households grow horticultural commodities, principally for home use and sale. For most rural households, home-produced fruits and vegetables provide an important source of the micro-nutrients necessary for a healthy balanced diet. More than half of

¹ Source: National Institute of Statistics of Rwanda (NISR), *Statistical Yearbook 2013*. This shows estimated 2012 GDP to be Frw 4,363 billion to which agriculture contributed Frw 1,438 billion (33%). Some 88% of agriculture's contribution comprised crops (Frw 1,260 billion).

households (58%) have a vegetable garden. These households show significantly better food consumption patterns than those who do not, with only 18% of them having unacceptable food consumption compared with 25% of the households who do not own a vegetable garden.² Occasional sale of surplus fruits and vegetables provides rural households with a valuable source of cash income.

TABLE 1: The Estimated Importance of Horticulture Relative to all Crops in 2013

	Area (ha)	Production (mt)	Yield (mt/ha)	Farm-Gate Value ('000 Rwf)	Farm-Gate Value (Rwf/ha)
Vegetables	26,696	225,313	8.4	39,475	1,478,680
Fruit banana	53,540	335,930	6.3	46,157	862,099
Other fruits	10,973	65,801	6.0	12,015	1,094,984
All Fruits incl. fruit banana	64,513	401,731	6.2	58,172	901,710
Total horticulture	91,209	627,044	6.9	155,819	1,708,372
All crops	1,432,500	7,591,341	5.3	1,606,000	747,645
GDP				4,819,000	

Horticulture as a % of all crops	6.4	8.3	130.2	9.7	
Horticulture as a % of GDP				3.2	229

Sources: NISR *Seasonal Crop Survey 2013*, NISR GDP estimates, and unit value data derived from the March 2014 *Baseline Report on the Rwanda Horticulture Organisations Survey*.

Growth in the national population and in *per capita* GDP, coupled with progressive urbanisation, is likely to lead in the years ahead to strong growth in the domestic demand for horticultural products. Increases in the production of fruits, vegetables and cut flowers to satisfy this domestic market growth will continue to be an important source of national economic growth.

Despite the important role that horticulture currently plays in the national economy, exports are largely limited to relatively small amounts of cross border trade and to a small number of shipments to destinations outside the region. Notwithstanding this, there is potential for horticulture and floriculture to contribute to national economic growth, not only through raising output to supply the expanding domestic market, but also through rapid expansion in the export of fresh fruits, vegetables, cut flowers and processed horticultural products.

1.4 Objectives of National Horticulture Policy

The ultimate objective of Rwanda's development policy is to improve the welfare of the population at the most rapid rate possible. This requires fast economic growth, which, *inter alia*, will result in a rapid reduction in poverty and malnutrition. The objectives of the national horticulture policy are for the horticulture sub-sector to contribute directly to this process through rapid increase in:

² The proportion in early 2012 was estimated to be 58%. See: MINAGRI/NISR/WFP, (2012) *Comprehensive Food Security and Vulnerability Analysis & Nutrition Survey 2012 (CFSVA and Nutrition Survey 2012)*, page 57.

1. National horticulture production and in the efficiency of production.
2. The value which is added domestically within the horticulture sector and in the efficiency of such value adding.
3. Accelerated growth in net export earnings from trade in fresh and processed horticultural produce, thereby easing the foreign exchange constraint on national economic growth.
4. Rapid increase in the access of poor households to fruits and vegetables coupled with rapid improvement in the nutritional efficiency of fruit and vegetable use within poor households.

1.5 Alignment of the policy with other national policy documents

1.5.1 Vision 2020

Vision 2020 is Rwanda's long term framework for development. It was originally formulated in 2000, with targets for 2010 and 2020. Many of the targets, most notably for GDP growth and GDP per capita, had been met by 2010 and were revised upwards in a mid-term review. The overall goal of Vision 2020 is for Rwanda to achieve middle-income country status by 2020. The development of the horticulture sector will be important in achieving this goal, since it will contribute to the efficient use of the country's scarce land resources and, as incomes rise, it will cater for the associated rapid increase in the domestic demand for fruits and vegetables.

An aim of Vision 2020 is to diversify from agriculture, with services becoming the national economy's lead sector. Agriculture is nevertheless viewed as an important foundation for development, as reflected in the mid-term review, which raised the target growth rate of the agricultural sector to 8.5% per annum.

Agriculture is one of the six pillars of Vision 2020 with a goal of developing productive high value and market oriented agriculture. The policy areas identified as of most importance are:

- Institutional and legal reform to ensure security of land ownership
- Development of a market in land assets
- Extensive research and extension services
- Investment in rural infrastructure
- Use of high yielding varieties and intensive input use
- Promotion of agro-based manufacturing
- Environmental control measures to stem the decline in soil fertility
- Rural financing schemes and rural market development

The nation's horticulture sector will benefit from progress made in each of these areas and will also be an integral part of such progress, since rapid, efficient and effective development of the sector will require, for example, an expansion in research capacity, an increase in domestic processing, more intensive input use, and an improvement in the efficiency of rural markets.

1.5.2 EDPRS 2

The second Economic Development and Poverty Reduction Strategy (EDPRS 2), which runs from 2013 to 2018, is the nation's medium term plan to achieve the longer term goals of Vision 2020. EDPRS 2 has a GDP growth target of 11.5% per year, an export growth target of 28% per year, and aims to reduce those afflicted by poverty to less than 30% of the national population. The strategy is formed around four thematic areas: economic transformation, rural development, productivity and youth employment, and accountable governance. Each thematic area in turn sets out priority areas, of which those of most importance for agriculture are:

1.5.2.1 *Economic transformation*

- Increasing the external connectivity of Rwanda's economy and boosting exports.
- Transforming the private sector by increasing investment in priority sectors.

1.5.2.2 *Rural development*

- Increasing the productivity of agriculture.
- Connecting rural communities to economic opportunities through improved infrastructure.

1.5.2.3 *Productivity and youth employment*

- Providing skills appropriate for the service and industrial sectors.
- Enhancing entrepreneurship and access to finance to facilitate business development.

1.5.2.4 *Accountable governance*

- Strengthening citizen participation, awareness and demand for accountability.
- Improving service delivery.

EDPRS 2 sets out a series of foundational and cross cutting issues. The foundational issues of most importance to agriculture are macroeconomic stability, consolidating decentralisation, food security and reduced malnutrition. The cross cutting issues of most importance are capacity building, environment and climate change, family and gender, and regional integration.

EDPRS 2 envisages agriculture as having a crucial role in the economy both to provide the base for sustained economic growth and by making a large contribution to poverty reduction. The most important objectives for the sector are to increase rural household incomes, to provide incomes from diversified sources, and to increase food security.

Since horticultural production is more labour intensive than for most other crops and because value added per hectare tends to be higher than for staples, rapid expansion of the sector coupled with increased domestic value adding will make an important contribution to the meeting the country's economic development and poverty reduction targets.

1.5.3 PSTA III

The Strategic Plan for the Transformation of Agriculture (PSTA III) covers the five-year period 2013/14 to 2017/18. It is in effect the strategic plan which MINAGRI will employ to operationalise EDPRS 2 in the agriculture sector.

The goals of PSTA III are:

- To transform Rwandan agriculture from primarily a subsistence sector to a market-oriented, enhanced value creating sector.
- To develop the sector as rapidly as possible to increase rural incomes and reduce poverty and malnutrition.

The plan provides for a continuation of investment in land husbandry, irrigation and input supply and for an expansion of the Crop Intensification Programme (CIP) to further increase the productivity of staple crops. The sector will be modernised through investment in mechanisation, processing and post-harvest facilities.

PSTA III, contains a programme for value chain development and private sector investment (Programme N° 3), which includes horticulture, floriculture and essential oils. The value of horticulture and floriculture exports to all destinations are targeted to grow from their 2013 level of some US\$13 million to US\$306.5 million in 2018. Some US\$225.8 million of this 2018 target value comprises earnings from floriculture exports.

PSTA III sees a much stronger role for the private sector, with the public sector moving to the role of enabler and facilitator of private sector growth. Thus while public investment in basic infrastructure, research, extension and market development will continue to be important, the private sector is expected to increasingly take over full responsibility for agricultural production, processing, marketing and exports.

The National Horticultural Policy is consistent with this shift in the roles of the public and private sectors. Indeed, the perishability of most horticultural crops means that the sector must rely principally on market-driven private initiative. However, given that for Rwanda the exportation of fruits, vegetables and cut flowers to high-value international markets is at present an 'infant industry', there is a strong case for the government to support private firms embarking on pioneering new ventures, especially through measures to reduce risk. This may necessarily involve direct short-term, time-limited government involvement in commercial activities within public-private partnerships.

1.5.4 CAADP 2

The Comprehensive Africa Agriculture Development Programme (CAADP) was established in 2003 by the African Union through NEPAD, as a coordinated and Africa-led effort to grow the economies of Africa to improve livelihoods and reduce hunger. Rwanda has been a leader in embracing CAADP principles and in implementing programmes consistent with these principles. A second compact was signed in 2013 to guide CAADP 2 for a further five years to 2018, a period aligned with PSTA III.

The main goal of CAADP is to help African countries design and implement agricultural policies and initiatives that will accelerate economic growth, eliminate hunger, reduce poverty and improve food security. The targets of CAADP 2 include increasing agriculture's share of government expenditure to 10% and increasing agricultural GDP growth to 6% per year.

The National Horticulture Policy is aimed at accelerating growth in the value of agricultural output, rural household incomes, and the domestic production and availability of micronutrients through, inter alia, productive use of growing government support for the sector. Thus it is consistent with CAADP's goals.

2 Situation analysis of the horticulture sector in Rwanda

2.1 Data availability

Horticulture sub-sector policy analysis in Rwanda is hampered by a lack of data. This is due to:

- The large number of crops that comprise the sector, which makes reliable sample-based estimation costly.
- Because of this, MINAGRI's bi-annual crop assessments are unable to provide reliable area, yield and production estimates for individual fruits and vegetables. Consequently these crop assessments provide data only for 'vegetables' and for 'fruits'. This is also the case for the 2013 Seasonal Agricultural Survey Report of the National Institute of Statistics of Rwanda (NISR).
- The last comprehensive surveys that provide data on the production of individual fruits and vegetables were the 2008 National Agricultural Survey³ and the Survey Report of the State of Horticulture in Rwanda, published by the Rwanda Horticulture Development Authority (RHODA) in October 2008⁴, both of which are now six years out of date.
- Since most rural households grow fruits and vegetables, national output is high but spread between large numbers of producing units.
- On many small farms, vegetables and, particularly, fruit trees tend to be scattered amongst other crops making the area planted difficult to define and to measure.
- Post-harvest losses of fruits and vegetables are thought to be high, but there are no accurate estimates of the percentages lost on and off-farm.
- Data are collected on both formal and informal monthly cross-border exports and imports by crossing point but these have yet to be thoroughly analysed.
- There are no data on the internal movement of fruits and vegetables.
- There tends to be greater variation in the quality of fruits and vegetables than for many other crops, limiting, for each crop, the usefulness of data on the weight of output.
- Variation between crops in their value per kg means that data on the total weights of 'fruits', 'vegetables' and 'flowers' are of only limited use.

The data available on horticultural production has improved over the past year with the initiation by the NISR of a Seasonal Agricultural Survey, which it undertakes in partnership with MINAGRI. The 2013 Report of this survey contains estimates of the percentage usage by households in 2012/13 of the main fruits and vegetables grown in Rwanda during each of the three seasons. These estimates are made, not only for seasons A and B, as in the past, but also for season C. However, as with MINAGRI's crop assessments, data on area, yield and production are only reported for 'fruits' and for 'vegetables', not for individual horticultural crops.

³ National Institute of Statistics of Rwanda (NISR), (2010), *National Agricultural Survey 2008 (NAS 2008)*, February 2010.

⁴ RHODA (2008) *A Survey Report on the Status of Horticulture in Rwanda*, October 2008.

The analysis underpinning the National Horticulture Policy presented in this document is based on secondary data available in mid 2013 and anecdotal evidence provided by public sector specialists and entrepreneurs operating in the sector.

2.2 Structure of production

2.2.1 Rwandan Agriculture

Despite recent strong increases in economic activity in sectors such as construction and trade, work on their own farm is still the main activity for the vast majority of Rwandese. The third Integrated Household Living Conditions Survey (EICV3), undertaken in 2010/11, estimated that 93% of Rwanda's households cultivate at least one plot of land. In Northern Province the proportion is 98%.

Agricultural production in Rwanda is dominated by small-scale subsistence production on household landholdings that are typically of less than 0.5 ha and, for over a quarter of all farm households, are less than 0.2 ha. The total holding of each household is normally held in a set of scattered blocks, with households typically having from 3-5 blocks. There has been a substantial amount of consolidation of these blocks under government programmes to encourage and support farmers to combine their holding to allow larger-scale mono-cropping of selected staple food crops on contiguous parcels of land.

Land use is dominated in seasons A (September to February) and B (March to July) by the growing of staple food crops, mainly beans, bananas, cassava, maize and sorghum. In season C (August to September), the main crops are Irish potatoes (71%), beans (14%) and vegetables (12%), grown principally in marshlands.

Nationally, farming is undertaken mainly by individual farm households. Less than one percent is carried out by cooperatives.⁵ About one percent of households have holdings of over 5 hectares and there are a small number of farms of over 50 ha, most of which are in Eastern Province.

2.2.2 Horticulture production

2.2.2.1 Aggregate Horticulture Production

In 2012/13, fruits and vegetables covered an estimated 6.5 percent of land planted to all crops in Season A and 6.0 percent in Season B. During Rwanda's three seasons, fruit and vegetable output accounted for an estimated 8.3 percent of the weight of all crops (see Table 2 and Statistics Annex Tables 2 and 3).

The majority of the national area and weight of fruits and vegetables comprises fruit bananas. If fruit bananas are excluded, vegetables are considerably more important than fruits, both in terms of area planted (27,000 ha. vs. 11,000 ha.) and weight of output (255,000 mt vs. 66,000 mt). Nationally, season B is of more importance for fruits and vegetables as a whole, principally due to heavy season B harvests of fruit bananas in Eastern Province. For vegetables, season A is of greater

⁵ NISR (2013) *Seasonal Agricultural Survey Report, 2013*.

importance than B, other than in Southern Province. Some 6.5 percent of vegetables are grown during season C.⁶ For fruits other than fruit bananas, the season B harvest exceeds that of season A.

TABLE 2: Percentage of total land and national production which was accounted for by fruits and vegetables in 2013

	Season A	Season B	Season C*	All seasons
Area				
Vegetables	1.9	1.6	100.0	
<i>Fruit banana</i>	3.9	3.6	0	
<i>Other fruits</i>	0.8	0.7	0	
All fruits	4.7	4.4	0	
All fruits and vegetables	6.5	6.0	0	
Total land cropped	100.0	100.0	100.0	
Production				
Vegetables	4.0	2.3	25.6	3.4
<i>Fruit banana</i>	4.0	4.9	-	4.4
<i>Other fruits</i>	0.9	0.9	-	0.9
All fruits	4.9	5.8	-	5.3
All fruits and vegetables	8.9	8.0	25.6	8.3
All crops	100.0	100.0	100.0	100.0

Source: NISR (2013) Seasonal Agricultural Survey Report, 2013. For a detailed analysis by region, see Statistics Annex Table 3.

*The survey data for season C refers to marshland only.

Vegetable production is spread fairly evenly across provinces, due in part to the widespread importance of household vegetable gardens. Northern Province is the most important producer of fruits other than fruit bananas due to much higher mean yields than obtained elsewhere. Fruit bananas, which are grown widely throughout most of Rwanda, are of particular importance in Eastern and Southern provinces, which account for approximately two-thirds of national output.

2.2.2.2 Vegetables

Most vegetables are produced on very small plots of land, usually as part of a vegetable garden, in which households grow principally eggplant, cabbage, carrot and onions for home consumption and occasional sale. The total area devoted by households to each type of vegetable is very small, typically substantially less than one-twentieth of a hectare.⁷

Cabbage and tomato are by far the most important vegetables in terms of area planted and the weight of production. National production is similar for both, but the area planted to cabbage is greater, reflecting its lower per-hectare yield. Local eggplants rank third in terms of area and weight. Carrots and onions are also of importance. The per-hectare yield of carrots is much higher than onions, with the result that carrot production exceeds that of onions despite carrots having a

⁶ Note that some fruits are doubtless harvested during season C but that NISR data show fruit production during the months covered by this season as zero. This is because its season C data refer only to marshland.

⁷ Source: average areas planted to individual crops in season A, B and C reported in NISR's 2013 Seasonal Agricultural Survey.

smaller planted area. French beans and sweet peppers are also grown in significant amounts as well as smaller quantities of leeks and peppers.

The spatial distribution of the production of cabbages reflects their need for relatively cool growing conditions. National output is dominated by Northern Province, which accounts for about half of all Rwandan output. One Northern Province district, Gicumbi, accounts for about one third of total national production. Only small amounts are produced in Eastern Province due to unfavourable climatic conditions.

Two-thirds of Rwanda's tomatoes are produced in Eastern Province with most of the remaining one-third shared roughly equally between Western and Southern Provinces. There is little production in Northern Province. Within Eastern Province, Rwamagana, to the East of Kigali City is the key producing district, accounting for most of the province's output and over half of all national output.

Eastern, Western and Southern Provinces are all important producers of eggplants. Only small amounts are produced in the cooler climates found in Northern Province.

Some 87% of the nation's carrots are produced in Western Province, with just one of the province's districts, Rubavu, accounting for over half of national production.

2.2.2.3 Fruits

The majority of the nation's fruits are also produced by small farm households. Perennial fruits are mostly grown on trees scattered amongst staple food crops. This makes it difficult to define and accurately estimate the area planted. Nationally, fruit bananas and avocados are by far the most important fruits in terms of both recorded area and weight of production. Pineapple ranks third in terms of weight of production, mango third in terms of area planted. There is also significant production of passion fruit, tamarillo, lemon, orange and papaya.

The production of fruit bananas is spread fairly evenly over all provinces, with the highest producer, Eastern Province, accounting for about one third of national production. Production of the other main fruits tends to be spatially more concentrated than for the main vegetables. Southern Province accounts for roughly half of national avocado output. Five districts account for almost half of national avocado production, four of which are in Southern Province, with one in Western Province.⁸ Northern Province accounts for almost half of national pineapple production, the vast majority of which is grown in just one district, Gikenke. Eastern Province accounts for about 45 percent of national mango output. There is a small amount of larger scale production of pineapples and avocados in Eastern Province.

2.2.2.4 Summer flowers

Small amounts of summer flowers are grown by rural households. There has been little systematic collection of data on this activity. The 2008 NAS showed aggregate annual national production of 'ornamental' and 'trade' flowers to be 200 mt.

⁸ RHODA (2008, *op cit*).

2.2.2.5 Exotic flowers

There are a small number of farms which grow roses for the domestic market. The government is in the process of constructing a flower park at Rwamagana in Eastern Region. It is planned that this will eventually have 35 hectares of greenhouses devoted to the growing of medium-sized roses. By mid-2014, 2 hectares of greenhouses had been partially constructed together with a packhouse and a spraying house. A tender for a further 8 hectares had also been finalised. The flower park will be owned by the government with a minority holding by an experienced Kenyan floriculture company.

2.3 On-farm consumption and usage

The majority of fruit and vegetable production is marketed (Table 3). This comprises both produce grown explicitly for sale and seasonal surpluses produced in household vegetable gardens. While there are no hard data on farm earnings from the sale of fruits and vegetables, such earnings are widely thought to be an important source of cash income for small-scale households. Roughly one-third of national fruit and vegetable output is consumed by the producing household (Table 3). This auto consumption provides an important source of micronutrients for well over half of all Rwanda's households.

TABLE 3: The Seasonal Usage of Fruits and Vegetables by Producing Households
(%)

	Season A						Season B					
	Sold	Auto consumed	Gifted	Stored	Other*	Total	Sold	Auto consumed	Gifted	Stored	Other*	Total
Tomatoes	61	29	8	1	1	100	72	25	3	0	1	100
Cabbage	51	37	11	0	1	100	52	40	8	0	1	100
Onion	59	30	5	1	6	100	53	31	2	1	13	100
Carrot	71	26	3	0	0	100	55	43	2	0	0	100
Eggplant	46	48	5	1	0	100	47	45	7	0	0	100
Other veg.	40	51	5	0	4	100	60	27	8	0	6	100
Fruit bananas	61	37	2	0	0	100	61	35	3	0	1	100
Pineapple	43	50	7	0	0	100	48	37	11	1	3	100
Avocado	48	26	4	19	2	100	48	46	7	0	0	100
Passion fruit	89	11	0	0	0	100	100	0	0	0	0	100
Other fruit	57	36	8	0	0	100	57	40	2	1	0	100
	Season C											
Tomatoes	78	16	5	0	1	100						
Cabbage	63	31	5	0	1	100						
Onion	78	11	11	0	1	100						
Carrot	93	3	3	0	1	100						
Sweet pepper	99	1	0	0	0	100						
Garlic	90	0	0	0	10	100						
Leeks	46	39	6	0	9	100						
Amaranths	30	60	10	0	0	100						

Source: NISR 2013, *op cit.*

* Other uses are: payment for wage labour and farm rent, bartered, use as fodder, and use as seed. This latter use accounts for most of the 'other' percentages for onions, leeks and other vegetables. Small amounts of avocado are used as fodder.

2.4 Domestic marketing

There has been little analysis of the structure of the marketing channels for fruits and vegetables that are consumed domestically in fresh form, other than for sales by organisations. It is thought that over two-thirds of marketed horticultural production does not leave the district in which it is produced. Coupled with on-farm consumption, this suggests that at least three quarters of production does not leave the district in which it is grown, being consumed on-farm, consumed off-farm within the district, or lost due to deterioration beyond use.⁹

Much marketing is opportunistic and informal. Some of the fruit and vegetable production of small-scale households is doubtlessly sold very locally. The majority is thought to be taken by members of the producing household either to local rural markets, to markets in provincial towns or directly to known urban households. Transport is mostly by head load or bicycle. For most households this requires considerable effort since, despite the small size of the country and the high population density, the nation's hilly terrain means that the nearest market is often many miles away.

While district markets around the country are well connected by road, getting to and from the market is a challenge for many rural households. Only 6% of households are served by a market facility within their village. The rest have to walk on average 1h and 15 min to another village to reach a market place. This average rises to well over two hours in the worst affected district, Rulindo. Although most households do not have a market in their community, 71% of the population are less than 5km from a main road with public transport. Almost three quarters of these roads (73%) are accessible year-round, while 27% are inaccessible during parts of the rainy season.¹⁰

The long distances that are often travelled to get produce to a market means that the seller has little bargaining power on arrival and must depend on competition between buyers. This is often low due to a lack of local buying power and collusion between market traders.

The only systematic movement of horticultural produce within the domestic market is by middlemen, who assemble consignments locally for sale in Kigali. Some of these are delivered directly to educational establishments, hotels, restaurants, hospitals and other institutions. There are three main multipurpose wholesale-cum-retail markets in Kigali at which there are specialised fruit and vegetable wholesalers. Most of their trade is in the main vegetables: tomatoes, cabbages, onions and carrots. The three markets provide shelter and basic security for small fruit and vegetable traders, who typically have stalls of 1.5m² each. The trading of fruits and vegetables takes place alongside general trading of goods such as shoes, clothes and kitchen utensils. The markets are generally crowded with limited room for expansion in the immediate vicinity. Wholesaling activity takes place during early trading hours from 6 a.m. to 9 a.m. in the open air outside the markets, generally directly from the back of small and medium-sized trucks. Wholesalers do not have access to cold or temperate storage or other value-adding services. After 9 a. m. the wholesalers must remove any unsold produce and find somewhere to store it until the following day. Often it remains on the truck parked at the side of the road, leading to high losses.

⁹ For Organisations, in 2013, an estimated average of 72% of horticulture sales did not leave the district in which they were produced (NAEB (2014B) *op cit.*)

¹⁰ All data in this paragraph are from Section 3.2.1 of MINAGRI/NISR/WFP, 2012, *op. cit.*

In Kigali and Rwanda's main towns, fruits and vegetables are mostly retailed by farmers and traders selling informally at the roadside and by small shops and kiosks which typically sell a mixture of foodstuffs and other essential household items. In Kigali, both domestically produced and imported fresh fruits and vegetables are also retailed by a set of supermarkets. These supermarkets also carry large stocks of imported canned, bottled and packed horticultural products, mostly sourced from Kenya, South Africa and Egypt, with smaller amounts from Uganda, EU countries, Gulf states and China.

There are no readily available data on the amounts of fruits and vegetables that are consumed in Kigali. The 2012 4th Population and Housing Census of Rwanda showed that 1.35 million of Rwanda's total resident population of 10.54 million lived in the capital city. Assuming that the populations of Rwanda and of Kigali have continued to grow at the rates estimated since the prior 2002 Census, an estimated 11% of the nation's population currently live in Kigali in 2014. Estimation of the flow of fruits and vegetables into Kigali from the four main provinces is complicated by the rapid growth of Kigali's peri-urban areas, where most houses have their own vegetable gardens. The lack of information on fruit and vegetable flows has posed a major problem for designers of the new wholesale market for horticultural commodities which is to be built in Kigali.¹¹

The full national extent of post-harvest losses of fruits and vegetables is unknown. Losses are widely assumed to be exceptionally high on the grounds that there are significant losses in Rwanda for storable staples and one would expect the losses of perishable fruits and vegetables necessarily to be much higher. 'Up to 40%' has been quoted in reports for a number of years, but there would seem to be no firm basis for this figure.

2.5 Processing

Most of Rwanda's fruits and vegetables are consumed in fresh form. A study of the processing of horticultural crops undertaken by NAEB in mid 2013 found that there were 258 processors distributed provincially as shown in Table 4. Some 57% of these were owned by companies and cooperatives and 43% by individuals. It is thought that the total number of processors may now be less than in 2012 due to some of the less competitive processors ceasing production. Processing takes place mainly in rural areas near the source of supply. It is mostly carried out on a very small-scale cottage industry basis, using simple equipment and labour intensive methods.

The dominant form of processing is the making of wine and spirits from bananas, which in 2013 accounted for over two-thirds of all enterprises processing vegetables and fruits. Most of the remaining processors transform pineapples and passion fruits into natural fruit drinks, either ready-to-drink or concentrate, which they either bottle or pack in labelled cartons ready for retail sale. A small number of enterprises make strawberry, pineapple and gooseberry jam and preserves which are packed and sold in labelled glass or plastic jars. There are also a small number of enterprises which dry fruits and vegetables, principally pineapples and green chillies. There are one or two small-scale specialist processors, including a processor of tomato paste and ketchup, a producer of dried leaves of the bushy shrub, *lippia triphylla*, and producers of avocado oil.

¹¹ See Section 2 of Infraco (2010), *Kigale Wholesale Market for Fresh Produce*, November 2010. Note that the 2010 figure of 150,000 mt in this report includes 'staple' fruits and vegetables, including Irish potatoes and cooking bananas.

TABLE 4: Domestic Processors of Agricultural Products, 2012

Province	Raw Material	Number	Percentage
Northern Province	Pineapple, passion fruit, banana, pyrethrum, other fruits	40	15.5
Eastern Province	Banana, pineapple, passion fruits, other fruits	82	31.5
Southern Province	Banana, pineapple, passion, tomato, vegetables	77	30.0
Western Province	Pineapple, banana, other fruits	20	8.0
Kigali City	Banana, tomato, chilli, other fruits, moringa	39	15.0
TOTAL		258	100

Source: NAEB (2012) *Product and Development Research, Horticulture*, unpublished.

There are three small-scale processors of macadamia nuts. The roasted kernels are sealed into foil bags which are imported in rolls from Kenya. Weighing, packing and sealing of the bags are done manually by small teams of women.

There are currently five small-scale enterprises which extract essential oils from flowers and leaves using a simple basic process in which steam is passed through the fresh or dried flowers or leaves in a sealed container and then liquefied in a spiral condenser. The fluid is then passed into a container where the oil floats to the top and is tapped. The main raw material is fresh geranium flowers, followed by dried patchouli leaves and *tagetus minuta*, a marigold native to South America. Virtually all Rwanda's essential oil output is exported.

One company, established in 2012, has recently commenced extracting oil from the seeds of the fast growing evergreen deciduous tree *Moringa Oleifera* for export to Europe and the USA. The growing of Moringa was widely promoted in Rwanda a decade ago but a market for its output could not be established. The present processor is using seeds imported from Uganda until sufficient are produced from the 50,000 seedlings that it has distributed from its four nurseries to some 700 farmers. In Rwanda, the seeds can be harvested for eight months of the year. They are dried on farm and dried further at the plant. In dry form, they can be stored for a year without significant deterioration. They can be hulled either by machine or by hand prior to being fed into an oil extractor. The oil is filtered prior to being packed for export.

2.6 External Trade

Rwanda borders four countries, Uganda, Tanzania, Burundi and the Democratic Republic of Congo. It is subject to the trade arrangements of the Common Market for Eastern and Southern Africa (COMESA) and the East African Community (EAC), which it joined in 2007. The other member states of COMESA are Angola, Burundi, Comoros, Democratic Republic of Congo, Djibouti, Egypt, Eritrea, Ethiopia, Kenya, Madagascar, Malawi, Mauritius, Rwanda, Seychelles, Sudan, Swaziland, Uganda, Zambia, and Zimbabwe. The other members of the EAC are Burundi, Kenya, Tanzania, and Uganda.

There is no taxation of foodstuffs crossing Rwanda's borders with neighbouring countries or traded with Kenya. Most foodstuffs can also move freely within COMESA without being subjected to import or export duties. The exception is commodities classified as 'sensitive', which can be taxed at the border by the importing country.

Given Rwanda's small size and its relatively porous borders that allow high amounts of informal unregulated trade, the total amount of trading of horticultural products with its neighbours is either under recorded or remarkably small. According to the available data collected by the Rwanda Revenue Authority and the National Bank of Rwanda, total formal and informal cross-border exports of fresh vegetables in 2013 amounted to an estimated 31,900mt, valued at US\$9.5 million (Table 6). Exports of fresh fruits and fruit juices were 1,800mt valued at US\$652,000. Cross-border imports of fresh vegetables were 12,000mt, valued at US\$2.8 million. Imports of fruits and fruit juices were an estimated 7,800mt, also valued at US\$2.8 million. The combined value of 2013 cross-border exports of horticultural produce amounted to US\$10.1 million (Rwf7.2 billion), equal to some 4.6% of the US\$ 218 million (Rwf 156 billion) national farm-gate value of horticulture output.¹²

International exports of fruits and vegetables to countries outside the region are currently very small. In 2013, exports of edible vegetables and tubers were an estimated US\$3.5 million. The low unit value of these exports suggests that they comprised principally tubers. Exports of edible fruits and nuts were valued at only US\$63,000 and preparations of vegetables, fruits and nuts at US\$680,000.

¹² Note that this figure of 4.6% is based on a comparison of *CIF* value of exports with the *farm-gate* value of domestic production and therefore tends to overestimate the importance of exports.

TABLE 6: Cross-Border Exports and Imports of Fruits and Vegetables, 2013

	EXPORTS			IMPORTS			NET EXPORTS	
	Weight (kg)	Value (US\$)	Unit Value (US\$/kg)	Weight (kg)	Value (US\$)	Unit Value (US\$/kg)	Weight (kg)	Value (US\$)
Fresh beans	22,647,045	5,087,584	0.22	6,988,857	1,296,960	0.19	15,658,188	3,790,624
Onions	1,476,365	532,134	0.36	2,122,693	452,651	0.21	-646,328	79,483
Tomatoes	0	0	-	767,080	375,651	0.49	-767,080	-375,651
Fresh peas	266,248	254,602	0.96	50,080	27,914	0.56	216,168	226,689
Cabbages	1,052,434	212,329	0.20	379,163	61,438	0.16	673,271	150,891
Other vegetables*	6,491,742	3,407,793	0.52	1,688,581	565,304	0.33	4,803,161	2,842,489
Total vegetables	31,933,834	9,494,442	0.30	11,996,454	2,779,918	0.23	19,937,380	6,714,524
Citrus	104,405	85,730	0.82	2,902,236	954,426	0.33	-2,797,831	-868,696
Apples	2,985	3,716	1.24	558,883	585,071	1.05	-555,898	-581,355
Mangoes	300	300	1.00	1,553,347	544,095	0.35	-1,553,047	-543,795
Avocados	523,875	75,443	0.14	668,913	59,737	0.09	-145,038	15,706
Fruit bananas	165,797	138,103	0.83	188,223	112,010	0.60	-22,426	26,093
Other fruits*	1,086,468	348,560	0.32	1,889,007	530,789	0.28	-802,539	-182,229
Total Fruits	1,883,830	651,852	0.35	7,760,609	2,786,128	0.36	-5,876,779	-2,134,276
Total vegetables and fruit	33,817,664	10,146,294	0.30	19,757,063	5,566,046	0.28	14,060,601	4,580,249

Source: Based on data assembled by NAEB.

* Vegetables/fruits with an export and/or import weight of over 100,000kg or value of over US\$50,000.

2.7 The Prevalence and Roles of Horticultural Organisations

NAEB undertook a detailed survey of Rwanda's horticultural organisations in 2013, which covered all 1,155 of the nation's existing horticulture cooperatives (607), registered (193) and unregistered (313) horticulture associations and 'large' horticulture farms (38).¹³ For the purpose of this survey, both cooperatives, and large farms were defined as having over the past 12 months (a) 0.5 hectares in collectively operated open field horticulture, and/or (b) at least 100m² of collectively operated greenhouses, and/or (c) gross horticulture sales of Rwf 5.0 million.

The estimated 2013 total weight of horticultural sales of these organisations were equivalent to 10.3% of estimated 2012/13 national vegetable production, 1.6% of estimated national fruit production, and 4.7% of estimated total horticulture production.¹⁴ **These small percentages highlight the extent to which national production of horticultural crops is dependent on the production of very large numbers of independent small-scale farm households.**

2.7.1 Horticulture cooperatives and associations

Government policy is to support the establishment of horticultural cooperatives and associations. For horticulture, led by NAEB and RCA, it has been highly successful in this aim. Horticultural cooperatives and associations are growing rapidly. Over 90% of those enumerated in the survey had been established since 2000 and more than half since 2010. **The main activity of the vast majority of horticulture organisations is production.** Only 14 of the enumerated 1,155 were engaged in processing and just a further 14 in marketing.

The survey found that, in 2013, just 11 organisations accounted for 57% of the total sales of the nation's 1,155 horticulture organisations and that just 20% of organisations accounted for 93% of these sales. Thus, a key finding of the survey is that there are vast differences between organisations in terms of scale.

Horticultural organisations are widely distributed throughout Rwanda. However, the 2013 survey found that two districts, Kamonyi and Rusizi, with less than 10% of the country's horticultural organisations account for some 46% of the national value of organisation sales of fruits and vegetables. The mean sales value of Kamonyi's organisations was Rwf 36 million. Other districts, such as Nyamasheke, with 46 horticultural organisations (4% of the national total), account for only 0.35% of the national value of fruit and vegetable organisation sales, with the mean annual sales value of the district's organisations amounting to only Rwf 410,000.

All but a small number of horticultural cooperatives and associations have mixed membership. Women outnumber men by a ratio of 1.27:1. There is a negative correlation between the proportion of female members in the organisation and the size of the area which members farm cooperatively. Women-dominated organisations tend to achieve higher outputs per unit of land but

¹³ NAEB/MINAGRI, (2014) *Final Report on the Rwanda Horticulture Organisations Survey*, March 2014.

¹⁴ These percentages are based on a comparison of national production estimates in NSIR's 2012/13 Seasonal Crop Survey Report 2013 with estimates of the production of horticultural organisations shown in Table 3 of the March 2014 Final Report on the Rwanda Horticulture Organisations Survey, *ibid*. The very low percentage for organisations' share in national fruit production would seem due principally to very low production of fruit bananas by cooperatives.

at the expense of lower average returns to labour. It would seem likely that this is a consequence of women's disadvantageous access to land, which results in women-dominated organisations squeezing more out of the land at the expense of a low mean return to their labour.¹⁵

The 2013 survey further found that some 44 percent of organisations had received support from outside entities, focused principally on the provision of seeds, agricultural chemicals, tools, and advice on cultural practices. This was funded from a variety of sources, including the local authority, NAEB, RAB, international donors and domestic and international NGOs.

Roughly two-thirds of the organisations focus on vegetables and one-third on fruits. Nationally, four crops comprise over two-thirds of the gross sales value of organisations: tomatoes (28%), onions (14%), cabbage (13%) and pineapple (13%). The remainder is generated mainly by local eggplants, carrots, sweet peppers, French beans and papaya. Cut flowers account for only 0.4% and plants grown for the extraction of essential oils only 0.1%.

Most fruit is grown on hillsides whereas over three-quarters of vegetables and almost all flowers are grown in valleys. Horticultural production faces strong competition for land from other crops, especially those being promoted under the national crop consolidation and regional specialisation programmes. The most intense competition is from maize being grown on consolidated land in valleys.

Horticultural organisations sell their output principally to retailers (52%) and to wholesalers (39%), who often purchase under pre-negotiated contracts. Some 8% is sold to supermarkets, hotels, restaurants, schools, prisons and other institutions. Small amounts are sold to processors, principally enterprises that make juice and wine. Such sales are normally contracted seasonally in advance. Most produce is consumed or otherwise utilised within the organisation's district. An estimated 12% goes to Kigali, about 2% is exported to neighbouring countries, and a very small amount is exported internationally.

Only 17 organisations have certification of any kind, ten from the Rwanda Bureau of Standards, three from fair trade organisations, two are certified as organic, and one has HACCP and one Global GAP certification. A further 56 organisations are in the process of being certified. Interest in certification is much higher amongst processors, for which it is mandatory to have RBS certification.

2.7.2 Large holders

In 2013, there were 550 large-holder horticulture farms, as defined above. Just over half of these are in Eastern Province (accounting for 60% of the national area devoted to horticulture by large-holder horticulture farms), with 112 in Southern, 64 in West, 47 in North and 39 in Kigali. Large farms do not differ substantially from cooperatives and associations in terms of specialisation, with just over two-thirds growing vegetables, just under one-third growing fruits, four growing cut flowers, three producing nuts and three growing herbs and spices. The main vegetables grown are tomatoes and cabbages. The main fruits are pineapple, passion fruit and tamarillos. Three of the farms have green houses.

¹⁵ See NAEB, 2014B, op. cit.

3 ANALYSIS AND COMPONENTS OF NATIONAL HORTICULTURE POLICY

3.1 The purpose of adopting a national horticulture policy

With a small number of exceptions, Rwandan horticulture comprises independent farm households working their own land and private-sector processors and traders. To a certain extent, the activities of farmers can be influenced directly by the government, as for example has been done under the land consolidation and regionalisation programmes for staple food crops. However, there is generally less possibility to do this for horticulture due to the very small areas devoted to horticultural production on most farms. Horticultural crops also differ from staples in that in their fresh forms most are highly perishable. To avoid high losses, markets must work effectively with competition driving prices to levels at which the quantities supplied and demanded are equal, allowing markets to clear rapidly.

The purpose of the National Horticulture Policy is to maximise the contribution which Rwanda's horticulture sector makes to meeting national objectives. The policy is designed to achieve this by establishing an environment conducive to private sector initiative through the provision of a framework for the development of effective government regulatory and support activities. It also provides a framework for the development of measures suitable for support by international agencies, donors and NGOs.

3.2 Diversity within the horticulture sector

The horticulture sector is more complex than the staple food crop and traditional export crop sectors in that it embraces a large set of crops that differ significantly in terms of production characteristics, the physical characteristics of the harvested crop, and the need for and the degree of sophistication of processing. For many of the individual fruits and vegetables there are also more diverse processing options. In addition, for some horticulture crops there are more potential destinations for the fresh and/or processed products. The viability of exports to these destinations has in most cases yet to be thoroughly tested.

The complexity of the horticulture sector means that there is a very large set of horticulture policy options available to meet national objectives relating to economic growth, improving nutrition and poverty reduction.

Furthermore, most Rwandan rural households are horticulture producers, most of which produce for home consumption. Due to its nature, there is very little data on this household vegetable garden sector, even though it may well account for as much as 2-3% of national GDP. Household vegetable gardens are vital for the nutrition of small-scale farm households and the sale by households of occasional surpluses of fruits and vegetables is an important source of rural income.

3.3 Horticulture-sector segmentation and the framework for national horticultural policy

3.3.1 The Segments

Government policy is to transform the overall structure and functions of the horticulture sector by making it a major source of export earnings. This policy orientation towards exports reflects the high land pressure in Rwanda and the resulting need to use the nation's land for activities with high value-added per hectare. However, the successful transformation of the horticulture sector into a major source of foreign currency will not reduce the need to expand and improve the efficiency of the important existing sub-sector that serves the domestic market and generates export earnings through sales to the regional market. This established sub-sector has the potential both to contribute strongly to growth in GDP and to the elimination of policy and malnutrition. **As in successful sub-Saharan horticultural exporting countries, such as Kenya, this sub-sector is likely to remain for the foreseeable future a much larger direct contributor to Rwanda's GDP and to the elimination of poverty and malnutrition than horticulture production for export.**

Thus national horticulture policy must embrace a range of activities running from very-small scale production for home consumption to the production, processing and marketing of sophisticated commodities that meet the requirements of international markets. Given that policy must be implemented with a finite set of resources, this diversity makes policy development more complex and also requires a greater political input into policy making. In particular, a view must be taken on the weight to be given to (a) medium and long-term economic growth and (b) short-to-medium term poverty eradication and the improvement of the nutrition of rural and peri-urban households.

Traditional activities in the horticulture sector are becoming progressively more segmented **as a proportion of farmers producing horticultural commodities for home use and occasional sale move into growing fruits, vegetables and flowers explicitly as cash crops.** These farmers tend to devote one or more of their scattered plots solely to the production of horticultural crops.

Thus, horticulture policy must address the development of three sub-sectors with different characteristics and functions:

- a. Production for home use and occasional sale
- b. Production for sale in domestic and regional markets
- c. Production for export to international markets

The components of the policies and action plans to address these necessarily differ significantly. For example, assisting a group of small-scale farmers to address a disease that is afflicting tamarillos in the group's locality requires quite different measures from supporting the establishment of the contract farming of a crop which Rwanda has yet to export internationally. Notwithstanding this, there is no sharp dividing line between these categories. For example, part of the output of a small-scale farm's marketed output may find its way into a regional market, a farm household producing principally for domestic sale may consume a small part of its output, and a part of the output of a farm producing for the international market may not reach export standard and may be diverted to

the domestic market. Despite such blurring, these categories are sufficiently clear cut to be used as a basis for organising the framing of national horticulture policy.

3.3.2 Short-to- medium-term objectives for the three horticulture sub-sectors

Over the long term, the objectives of national horticulture policy are to accelerate national economic growth and thereby, inter alia, reduce poverty and malnutrition. In the short and medium term, the three sub-sectors will contribute to economic growth and the reduction of poverty and malnutrition through different mechanisms.

3.3.2.1 Sub-sector mechanisms

a. Production for home use and occasional sale

Policy towards this ‘household vegetable garden’ sub-sector has the potential to raise GDP and also to reduce poverty and malnutrition directly in the short and medium term, since it can directly affect low-income producers and malnourished households by (a) increasing their on-farm efficiency and value added, (b) improving the nutritional diversity of their diets, and (c) providing increases in the cash income realised from occasional sale of surpluses.

The policy objective for this sub-sector will be to achieve these beneficial changes efficiently and effectively.

b. Production for sale in domestic and regional markets

Policy towards this ‘domestic and regional market’ sub-sector has the potential to raise GDP and reduce poverty and malnutrition both directly and indirectly. In the short and medium term, increased and more efficient production will raise national GDP. It will also prevent deterioration in the national trade balance by increasing the domestic availability of horticultural products, thereby preventing expanded domestic demand from leading to an increase in imports. This will contribute to easing the impact of foreign exchange constraints on national economic development, thereby contributing to growth in national GDP and poverty reduction over the longer term. The additional farm income generated will benefit the involved farmers directly and may contribute to an improvement in the nutritional diversity of their households' diets.

The main objective for this sub-sector will be to increase value added and efficiency both on the farm and in the subsequent trading and processing of off-farm sales.

c. Production for export to international markets

Policy towards this ‘high-value international export’ sub-sector has the potential to raise GDP over the medium term by raising domestic value added through new farm production, and new, expanded and improved post-harvest activities, including domestic transport, cold storage, packaging and processing. It will also raise net national export earnings by the amount that the FOB value of the exported crops and the products derived from them exceeds the value of the goods and services imported for the sub-sector.

The objectives for this sub-sector will be to maximise its contributions to net export earnings and to domestic value added (including the value added to output which does not reach exportable standards.)

3.3.2.2 Sector wide mechanism

Rwanda has an abundance of labour and a shortage of land. The value added per unit of land in the production of fruits, vegetables and flowers tends to be much higher than for staple food crops. Most of the additional value added in horticulture stems from a higher use of labour per unit of land. **Thus, any shift from the growing of staple crops to the growing of horticultural commodities will raise domestic value added and GDP.**

Therefore, in addition to the above measures *relating to land currently devoted to horticulture*, an objective of national policy will be to increase the area of land devoted to horticultural crops. This is consistent with Rwanda's food security and nutrition objectives, since the nation is now self-sufficient in staple foodstuffs but deficient in the micronutrients necessary for a healthy balanced diet.

3.4 Domestic demand, cross-border trade and growth targets

The domestic demand for horticultural commodities will continue to grow strongly as a result of population increase and growth in GDP per capita. Table 5 contains projections of growth in the domestic consumption of fruits and vegetables during the period 2014-18, made using an assumed growth in the national population of 2.6% per annum and two assumed rates of growth for GDP. The rate of 5.7% is the estimated mean growth rate of Rwandan GDP between 2000 and 2012, while 11.5% is the target GDP growth rate set in EDPRS 2. The impact of these growth rates on fruit and vegetable consumption depends on the income elasticities of demand for each of these two commodity groups in Rwanda. A 2004 multi-country study by the WHO estimated that such elasticities in Rwanda were 0.99 for fruits and 0.65 for vegetables.¹⁶ The projections in Table 5 employ these elasticities.

The projections of consumption assume that demand will be met without any changes in the relative prices of fruits, vegetables and competing goods. For domestic demand to be met without an increase in imports there must be rapid growth in horticultural production, especially the production of fruits, which would need to grow by 2018 by 50% if GDP continues to grow at past rates and by 95% if the targeted EDPRS GDP growth rate were to be met.

¹⁶ Ruel MT, Minot M and Smith L (2005) *Patterns and determinants of fruit and vegetable consumption in sub-Saharan Africa*, Workshop on Fruits and Vegetables for Health, 1-3 September 2004, Kobe, Japan. Note that the data used was that collected in 1999 during the Integrated Household Living Conditions Survey 1 (EICV 1). Given this, and given the statistical problems inherent in such estimation, the use of these elasticities to make projections for the 2014-18 period necessarily means that the projections of consumption should be viewed as indicating orders of magnitude only.

TABLE 5: Projections of growth in the domestic consumption of fruits and vegetables for the five-year period January 2014-December 2018

	Estimated value of domestic consumption in 2013*	Projected value of domestic consumption in 2018 if:		Projected growth in consumption during the 2014-18 period if:			
		GDP growth is 5.7% p.a.	GDP growth is 11.50%	GDP growth is 5.7% p.a.		GDP growth is 11.5% p.a.	
	----- (million Frw) -----			(percent)		(percent)	
				Annual	2014-2018	Annual	2014-2018
Vegetables	34,679	47,673	57,966	6.4	37	10.8	67
Fruits (excl. fruit bananas)	13,521	20,233	26,381	8.4	50	14.3	95
Fruits and vegetables**	48,200	284,745	67,846	7.1	41	11.9	75

* Estimated value of national production (Table 1) less estimated value of national net exports (Table 5 data converted from US\$ to Frw). ** excluding fruit bananas.

There are only very limited data on annual levels of national production of vegetables and fruits and the data that are available tend to be conflicting (see Statistics Annex Table 4). Data for 2013 gathered during NISR's Seasonal Annual Survey is analysed by region in Statistics Annex Tables 2 and 3).

There are no time series data on the production of individual horticultural crops, other than fruit bananas. MINAGRI's annual crop estimates show that there has been a decline in the areas planted to vegetables and fruits over the past 5-6 years. Since the area planted nationally to crops other than vegetables and fruits has grown by an estimated 17% between 2009 and 2013, there have been sharp falls over this period in the estimated shares of vegetables and fruits in the total land planted to crops (Statistics Annex Table 1). Comparison of the data in NISR's 2013 Seasonal Crop Survey with that in its 2008 National Agricultural Survey shows a large increase in the national production of all crops, but a small fall in the production of vegetables and a large a large fall in the production of fruits other than fruit bananas (the production of which is estimated to have more than doubled). These estimated changes from 2008-2013 may be partly a result of anomalies in the data and partly because they are influenced by the weather conditions that prevailed in 2008 and 2013 and therefore do not accurately reflect changes in production capacity. However, the estimated falls in the area planted to horticultural crops and in horticultural production may also reflect the widely held perception that efforts to expand the production of staple food commodities under MINAGRI's Crop Improvement Programme (CIP) have led to the substitution of maize and other crops for vegetables and fruits.

This policy contains provisions aimed at inducing rapid expansion in national horticulture output. In the absence of any evidence of recent growth in horticulture production, an ambitious target is for the combined production of horticulture sub-sectors (a) and (b) to expand at the rates necessary to meet the projected expansion of domestic demand for horticultural commodities, thereby maintaining the small 2013 regional export surplus. On the assumption that the nation will continue

to meet the impressive growth rate of GDP of 5.7% achieved in the past, the combined production of sub-sectors (a) and (b) will need to expand by 6.4% per annum for vegetables and 8.4% per annum for fruits.

3.5 Targets for international exports

PSTA III contains export earnings targets for 2017-18 of US\$55.3 million for vegetables, US\$25.4 million for fruits, and US\$ 225.8 million for floriculture. Together, these amount to export earnings from horticulture of US\$306.5 million. This 2017-2018 target compares with the combined 2013 export value of Rwanda's three main export crops, coffee, tea and pyrethrum, of US\$145 million. Meeting this target within five years, would require the combined national per capita export earnings from vegetables, fruits and floriculture to exceed the current level in Kenya, which has taken some 30-40 years to achieve.¹⁷ Since, due to domestic growth in demand, Rwanda is unlikely to be able to increase its net cross border horticultural exports, these additional export earnings would need to come from a rapid increase in horticulture and floriculture exports to international markets. Unlike in the case of Rwanda's successful rapid expansion of staple food crops, this expansion would require that Rwanda not only increases its domestic production markedly but also competes successfully in foreign markets supplied by established exporting countries in the region, such as Kenya and Ethiopia, other African countries, including South Africa and Ghana, and countries in Latin America, such as Costa Rica and Colombia. An attempt to meet the PSTA III export target would require a major re-orientation of government agriculture development policy and of its financing priorities, including radical modification of the nation's Agriculture Sector Investment Plan (ASIP) to make the financing of growth in export horticulture a major component of the plan.¹⁸

Although it is a rational objective for Rwandan agricultural policy to give greater emphasis to high value horticulture, such a fundamental change in policy would require abandoning ongoing programmes and would not be in the national interest.

A realistic target is for Rwanda to reach 2013 Kenyan per capita horticulture export levels by 2028, i.e. over a period of 15 years. Linear growth towards this target would require horticultural export earnings to increase by some US\$14.4 million per year, leading to exports of US\$72 million in 2018.¹⁹ Although less than one quarter of the PSTA III target, achieving this target will require substantially more public resources to be devoted to horticulture than at present. The division of these target earnings between vegetables, fruits and floriculture will depend on the outcome of the process described below in sub-section 4.3.2.1.

¹⁷ Kenya's exports of vegetables, fruits and flowers in 2013 were valued FOB at, respectively, approximately US\$237 million, US\$46 million and US\$580 million, giving total export earnings from horticulture of US\$864 million. Kenya's population is roughly four times that of Rwanda.

¹⁸ Only 0.6% of the 2014-18 ASIP budget is allocated to the development of export crop value chains.

¹⁹ US\$72 million = one fifteenth of one fourth of Kenya's 2013 horticultural export earnings of US\$864 million. Linear rather than exponential growth is assumed since the competition between crops for Rwanda's land will increase over time, offsetting the fact that production for international export will be growing from a progressively expanding base.

3.6 The Importance of systematic development of crop-specific value chains

For all agricultural commodities that are marketed, it is essential that the policies for their development cover entire value chains from the supply of inputs and services to farmers through to points of final domestic consumption and/or export. For horticultural goods, unlike for more 'commoditised' goods, such as coffee, policy measures may need to extend beyond FOB due to the need to establish trading partnerships with buyers in importing countries.

Due to the large number of crops within the horticulture sector and, for many crops, the existence of a set of possible options for their processing, there is considerable diversity between horticultural crops in the length of chains, the number of times the commodity changes ownership, the storability and other physical characteristics of the commodity and of its products at different stages of the chain, downstream investment needs, and the quality and other demands of the final market.

Most of Rwanda's horticultural output is currently consumed in fresh form, a significant part of which is consumed by the farm household which produces it. Despite the relatively simplicity of most existing chains, each involved activity needs to be improved to the extent possible. For example, certified seeds need to be made widely available and affordable, pests and diseases need to be effectively countered, consuming households need training in how to ensure they maximise their nutritional intake when consuming fruits and vegetables, market surpluses need to be traded efficiently, and local seasonal gluts need to be avoided.

No matter how simple or complex the value chain, it is vital that all parts of it are in place and that it has no weak links. Thus, for each crop, development of the chain must be carefully coordinated. This is a challenge institutionally, given the small amount of vertical integration within the horticulture sector and the fact that most chains involve activities that, at different stages of the chain, are the direct responsibility of either MINILOCO, MINAGRI, or MINICOM. Furthermore, within MINAGRI itself, NAEB, RAB and MINAGRI Central all have responsibilities for activities relating to horticulture value chains.

3.7 Sub-sector weighting

The most fundamental policy issue is the extent of emphasis that policy and associated implementation strategies should give to each of the three sub-sectors. The current importance of production for home consumption and its direct impact on poverty and household income suggests that sub-sector (a) should receive priority. The anticipated rapid increase in the domestic demand for horticultural production that will come with economic growth and urbanisation gives production explicitly for sale to the domestic and regional markets (sub-sector (b)) a claim to being accorded priority. Finally, the country's urgent need to generate foreign exchange coupled with the fact that Rwanda's agro-climate conditions are ideal for growing a wide range of crops for which there is strong demand in Europe and the Middle East, suggests that production for international export (sub-sector (c)) should be given priority.

The choice of weighting is not an issue that can be resolved solely by policy analysis since the impact on economic growth, nutrition and poverty alleviation of measures within each sub-sector cannot be forecast with sufficient accuracy. Furthermore, there is a trade-off between policy measures which

alleviate poverty and improve nutrition in the short term and measures that focus on economic growth, which will serve largely to eliminate poverty and malnutrition over the long term. The choice of policy focus for the sub-sector is essentially a political decision. Consequently, the weight to be given to each sub-sector will need to be decided as this draft policy is transformed into an agreed policy through debate and negotiation within government.

4 Horticulture Sub-Sector Policies

4.1 Policies for Sub-sector (a): production for home use and occasional sale

This sub-sector can be expected to reduce in size as the economy develops and more farm households move into the production of vegetables, fruits and flowers for sale domestically and regionally. As it declines in size, the sector is likely to become progressively more dominated by the poorest horticulture-growing households. However, those households which move into the commercial growing of one or a small-number of horticultural crops are still likely to retain a diversified household vegetable garden for home consumption. Thus, the importance of policies relating to such gardens will largely be maintained.

4.1.1 Strengthening training and advice

The growing of horticultural crops is more management intensive than the growing of most staple foodstuffs. This applies particularly to the management of pests and diseases, to which horticultural crops are particularly prone. Households in this sub-sector are unlikely to be members of cooperatives and almost certainly do not engage in contract farming. This precludes them from two potential sources of extension and training.

MINAGRI and MINILOC switched formally to a farmer-to-farmer 'Twigire' extension structure in the first half of 2014, after a successful piloting and gradual introduction of the structure from September 2012. Under this mode of extension, farmers within each village divide into groups of 15-20. The groups each select a leader and also agree on priority crops. Some three farmers from each group then receive training in activities relating to the priority crops which is provided at the village level by a selected farmer promoter. There are typically about one hundred farm households at the village level and therefore typically 5-7 groups. Farmer promoters receive an intensive training at the cell level from Farmer Field School (FFS) Facilitators, who specialise in different crops. Each cell has approximately 1,000 farm households. These facilitators are local farmers who undergo three one-week sessions of intensive training during a three-month period. The training is provided by 45 RAB Master Trainers, whose training, in turn, covers a wide range of crops, including horticultural crops, for which guidance is provided by NAEB's two crop protection officers (a plant pathologist and an entomologist).

Activities within the structure are financed from the government budget, with more of the total extension budget going to the districts than under the prior extension system, reflecting the new structure's participatory grass-roots orientation.

This new extension structure has the potential to reach all small-scale farmers and to support their activities effectively, including the production and marketing of horticultural crops. It would seem likely that locally dominant horticultural crops will be amongst those selected by farmer groups as priority crops. This will give all farmers in the group access to related training and extension advice. This is a major step forward for small-scale horticulture.

The topics covered by each extension group will be identified by farmers within the group. For the system to operate effectively it will be essential that a system be put in place to ensure that the underpinning research and training of trainers reflect the identified topics. This will place a heavy demand on RAB research stations and will require that horticultural research receives much greater funding and support than at present.

It is planned that all group leaders will receive training relating to maize and beans. It will be necessary to ensure that throughout the extension hierarchy the requirements of horticulture production, post harvest activities and marketing are given the attention and financial support which their importance deserves and that they are not crowded out by the demands placed on the system by the main staple food crops.

4.1.2 Improving access to inputs and markets

Farm households have difficulty in accessing the seed and other inputs which they need due to the small quantities involved, which are often less than contained in the smallest package available. Once packages are opened by rural dealers and the contents sub-divided, the purchaser has no assurance of quality and usually no means of checking their weight. Farm households also have problems in marketing their output efficiently, especially when this is in the form of small occasional surpluses produced in household vegetable gardens. They must often walk for long distances with head loads and have little market power once they arrive at the nearest local market.

The new extension structure does not only facilitate the adoption of good small-scale farming practices. The grass-roots grouping of farmers which it involves also makes it easier for farmers both to access inputs and to market surplus output. This is facilitated at the sector level by MINILOC's Sector Agronomist who plays a linking role between local agro-input dealers and farmers, including providing the dealers with projections of farmers' requirements for the forthcoming season. This helps ensure that the local agro-dealer is well stocked with the vegetable seeds which farmers will require.

The grouping of farmers will facilitate the marketing of households' small horticulture surpluses, since it will allow economies of scale in transport to local markets and will strengthen farmers' power when negotiating with assembly market traders.

4.1.3 Support for household vegetable gardens: production and usage

Household vegetable gardens, also referred to as 'kitchen gardens', have for many years been contributing to the nutrition of Rwanda's low-income rural and peri-urban households and providing an occasional but important source of cash income for these households. For the poorest households and those in areas remote from a local market, a small vegetable garden is often the only means of acquiring vegetables to supplement staple foodstuffs in the family's meals. The important function of household vegetable gardens has been recognised for many years, and their development has received support from the government, donors and NGOs. Much of this support has been on a pilot basis, testing new technologies and developing means of improving the ability of farm households to acquire appropriate inputs and access produce markets. In addition, there have been programmes which target the most nutritionally vulnerable households, such as a kitchen garden program to reduce Vitamin A and iron deficiencies, increase protein availability and raise

household income, which targeted the growing of carrots, amaranths, spinach and soya. Although useful, the support for household vegetable gardens has been patchy and has assisted only a minority of rural households.

MINAGRI will continue with its support for the production of staples and with other measures aimed at ensuring access to staple foodstuffs. However, it will now give greater focus to ensuring adequate production of horticultural crops, especially vegetables, to improve household access to sources of micronutrients necessary for a fully balanced diet. In addition to the initiatives discussed in the two above sub-sections, MINAGRI will execute further programmes aimed explicitly at improving nutrition through increased and improved small-scale production of vegetables, including programmes to:

- establish village nurseries for fruit trees
- provide support to household vegetable garden farmer field schools that comprise members of households most vulnerable to food insecurity
- provide technical assistance in food preservation tailored to meet the needs of the most vulnerable households
- establish and improve existing gardens at pre-primary, primary, secondary and vocational training schools so that pupils can participate in the growing, post-harvest preparation, nutritionally efficient cooking, and consumption of locally suitable combinations of nutritious vegetables and fruits. These gardens will provide small amounts of additional nutritious foods for pupils, but their primary purpose will be to educate pupils and they will be designed for this purpose alone.

In implementing these programmes, RAB and NAEB will work closely with other ministries, including MOH, MINALOC and MINEDUC. It should be noted that these programmes already form part of MINAGRI's Nutrition Action Plan and have been incorporated into the National Food and Nutrition Action Plan.²⁰

4.2 Policies for sub-sector (b): production principally for the domestic and regional markets

4.2.1 Data availability and analysis

Lack of data on the domestic market for horticultural produce is a major impediment to the formulation of policy. However, there *is* extensive data on cross border exports to neighbouring countries (see sub-section 2.6 above). These data are likely to be only approximate due to the fact that many trucks cross the border with loads of mixed fruits and vegetables, the total weights of which cannot be accurately allocated to individual crops. It would also seem likely that there is some trade which is not recorded. Notwithstanding this, the data give indications of relative orders of magnitude, which are useful for policy formulation.

²⁰ See Government of Rwanda (2013C) *National Food and Nutrition Action Plan 2014-2018* and MINAGRI (2013) *Nutrition Action Plan 2013-2018*, draft, 23 July 2013.

4.2.2 Types of producers in sub-sector (b)

The analysis above in sub-section 2.6 focuses on aggregate cross border trade with all neighbouring countries. As a basis for refining policy towards production for regional export and input substitution, NAEB will undertake a detailed analysis of the available data on cross border horticulture exports analysing them by trading partner country and exit point. The main aim will be to determine for which crops and for which border crossing points there are (a) significant permanent flows in exports of specific crops in one direction and (b) significant two-way seasonal flows.

Parallel with sub-sector (a) households which make occasional sales of fruits and vegetables, there is a set of farm households and organisations that grow horticultural commodities explicitly for the market, with only small, incidental amounts being retained for home consumption. This sub-sector comprises (i) small-scale farm households operating independently, which devote one or more of their plots to the production of horticultural commodities for the market, (ii) members of cooperatives and associations which produce fruits or vegetables collectively, and (iii) 'largeholder producers' with over 0.5 ha devoted to open field horticulture. In 2013, there were an estimated 550 such largeholder producers, almost 60% of which (288) are located in Eastern Province with a further 20% (112) in Western Province. Together, largeholders grow more than 30 different types of vegetables, fruits, flowers, herbs, and nuts. Tomatoes are grown by 209 largeholders, cabbages by 100, pineapples by 85 and tamarillos by 83. Nationally, largeholders produce about one-tenth as much (by value) as organisations. The amounts produced by independent small-scale farms which specialise in horticultural production are not known.

The use of greenhouses by producers for the domestic and regional markets is minimal, with the vast majority of output being grown in open fields.

4.2.3 Alternative production, processing and marketing models

Production for the market can be organised in a set of different ways, ranging from value chains in which there is no explicit vertical coordination to models that involve extensive vertical coordination and/or vertical integration.

4.2.3.1 Uncoordinated value chains

Most horticultural output is currently sold and bought through direct negotiation at the time of sale, with the buyer inspecting the produce prior to purchase. In such systems there is little or no scope for buyers to assist producers in their operations. Consequently, households producing horticultural products explicitly for the market will need to rely primarily on the same group support measures as described above for sub-sector (a) producers. Since sub-sector (b) producers are likely to be more progressive than fellow group members who focus on subsistence production, many are likely to become farmer extension group leaders. As such, they will not only benefit from group input purchasing and produce sales but will also be in a position to lead innovation and the local trialling of new crops, crop varieties and cultural practices.

Even with access to the new extension system, small-scale commercial horticulture farmers are likely to benefit significantly through being closely linked to other similar farmers and to a specific buyer of their produce. Thus policy will be to support them to associate and cooperate with other farmers and to participate in arrangements of the types discussed in the sub-sections below.

For those who continue to operate independently, their access to markets will be enhanced through the government's programmes to improve the network of rural access roads and to improve rural market infrastructure. These roads and markets are multi-functional and will not be included explicitly as a component of horticulture policy or in the budget necessary to implement it. However, the special needs of horticulture marketing will be taken into account in the design of rural market infrastructure, especially the need to minimise deterioration while produce is within a market facility and consequently the requirement that storage and trading areas be sheltered from the sun and well ventilated.

To cater for the anticipated strong increase in the demand for fresh fruits and vegetables in Kigali, a new market will be established dedicated to the wholesaling of fresh produce. A sufficiently large green field site has been selected to accommodate the long-term aim of the market being at the centre of a processing and packing hub for horticultural commodities. Provisional designs for the market have been prepared and are in the process of being refined, drawing on the experience of other African countries. It is anticipated that a business plan for the market will be finalised early in the second half of 2014. In addition to a design that will foster more efficient and hygienic trading than at the city's present three wholesale-cum-retail markets, a key aim will be to establish a more competitive trading environment in which the opportunity for wholesalers to collude is minimised. To this end, one feature of the new market will be improved accessibility for small-scale traders and farmers through the opportunity to lease small individual trading units and through the incorporation of a separate 'daily market' sales area.

Both banks and potential investors are likely to be reluctant to commit funds to this venture until it has shown that it is viable. Thus, public funds will be used to establish the market, to subsidise its early operation, and, possibly, to subsidise market fees initially to encourage wholesalers to relocate from the existing markets in Kigali.

4.2.3.2 Cooperative farming

Rwanda's horticultural associations and cooperatives are described above in sub-section 2.7. Most of these organisations undertake the collective production of fruits and vegetables on pooled hillside land and on publicly owned land allocated to them in valleys. Output per hectare of vegetables and especially fruits tends to be lower than on small-scale plots, possibly because farmers devote more attention to production on their own land than on communal areas. Only four of the largest eleven organisations grow under contract and, for horticulture organisations as a whole, only 11.4% do so. The majority sell their produce on the open market, principally to retailers.

Policy will be to continue to support existing horticulture organisations whose members *produce* collectively but to focus policy on developing and supporting horticulture producer cooperatives, the main function of which is *marketing*, especially the marketing of members' output to processors and larger-scale traders through contract farming arrangements.

4.2.3.3 Contract farming

Rwanda's 2007 Agricultural Land Use Consolidation Decree (ALUCD) provides for cooperative farming, facilitated contract farming, and joint corporate farming. The decree has been an important instrument underpinning the increase in the productivity of maize and other staple food crops under the nation's land consolidation programmes. However, it also provides a framework for

the development of a set of different value chain models, the potential of which has yet to be fully exploited.

For all but the smallest scale production, there is potential for developing value chains based on partnerships between farmers and downstream processors and traders. Experience from other African countries is that such partnerships can be of substantial mutual benefit to the parties involved, especially when based on contract farming.

A major constraint faced by small-scale farmers is that they experience difficulty in obtaining short-term credit from suppliers of inputs and are unable to raise the necessary funds from financial institutions. A common feature of contract farming is that the buying enterprise agrees to provide farmers with a set of inputs and services as loans in kind, the value of which it recovers from its payout to them. Such an arrangement requires that farmers sell sufficient of their output to the processor/trader to cover the full value of these loans.

In addition to giving farmers the capacity to acquire inputs and services, their provision by the buying enterprise benefits farmers in a number of further ways. First, because the enterprise can buy inputs in bulk, it can supply its contracted farmers at prices below those of local input traders. It can also import and transport inputs domestically in bulk, further lowering their distribution costs and increasing the potential for discounting their prices to farmers. Second, its close relationship with contracted farmers usually means that it can project their input usage more accurately than specialist input distributors and local input dealers, thereby minimising both local stockouts and the need to carryover unsold stocks. This reduces supply costs further and minimises the likelihood both of inputs being physically unavailable for farmers to buy and of the available stocks having deteriorated during prolonged storage. Third, the buying enterprise can supply contracted farmers with the appropriate quantities and types of fertiliser they require, including specialised fertilisers with added micronutrients. The buying enterprise can also provide technical assistance and training to farmers to improve both their production efficiency and the quality of their produce.

The buying enterprise, in turn, gains from such assistance in three ways. First, it causes contract farming to be attractive to farmers, making them more likely to engage in such farming and to deal with the enterprise in question. Second, by ensuring that its contracted farmers are able to acquire optimal amounts of good quality inputs, the buyer increases the likelihood that they will obtain both yields and quality that are sufficient to allow them to meet its contracted downstream supply obligations. Third, contract farming usually involves arrangements where the buying enterprise provides some form of technical assistance and/or training to farmers aimed at further yield and quality increase. Where possible, this is best done in partnership with staff of the government extension service formalised through a memorandum of understanding. There are many examples of such arrangements in sub-Saharan African, including in neighbouring Uganda. There are also many examples in sub-Saharan Africa where a buying enterprise has assisted its contracted farmers to raise funds from banks and other financial institutions both for the acquisition of seasonal inputs and for investment in the expansion of production capacity through the establishment of new areas under tree crops. As with enhanced input supply, these support activities not only benefit farmers but improve the quantity and quality of the supply of produce to the buying enterprise.

A strong cooperative of contracted farmers is a vital component of contract farming involving small-scale producers. Most such farming in sub-Saharan Africa and in the region involves cooperatives,

often created specifically to facilitate the contract farming arrangement. It will be necessary for cooperatives to be involved in most horticulture contract farming arrangements in Rwanda, because of the exceptionally small size of farms that means large numbers of farmers are likely to be supplying the buying enterprise.

Policy will be to encourage existing and new cooperatives to engage in contract farming arrangements and to support and strengthen the ability of cooperatives to perform their functions within such arrangements effectively. NAEB, in cooperation with the Rwanda Cooperative Agency (RCA), will support the strengthening of the management of horticulture cooperatives to ensure that, from the start, they can participate effectively and on equal terms with the buying enterprise.

NAEB will place particular emphasis on ensuring that the mechanism for determination of the price(s) at which the enterprise buys produce is contractually agreed between the cooperative and the enterprise in advance of farmers establishing the crop. This is particularly important where the buying enterprise intends to market the product in its fresh form and must sell rapidly at ruling prices in destination markets. This will necessarily involve a risk for the buying enterprise which, through negotiation, could be passed partially back to farmers through prior negotiation of a buying price from cooperative members which is indexed to a destination market price indicator.

To facilitate the efficient growth of contract farming, NAEB and RCA will work together to develop model contracts suitable for horticultural products, to train cooperative staff and processors/traders in the negotiation and enforcement of contracts, and to subsidise the provision of para-legal assistance for the negotiation and drafting of contracts.

It will be important that, as contract farming grows in importance, processors and traders develop a code of conduct that governs their dealings with farmer cooperatives and ensures that the negotiation of contracts is orderly and competitive.

4.2.3.4 Nucleus estate and outgrowers

Although accounting for only a small part of the national marketed output of horticultural produce, there are already a substantial number of contract farming arrangements for fruits, vegetables and flowers in Rwanda in which buying enterprises supply inputs as credit in kind and provide extension advice on-site through their own agronomists. However, these arrangements have not been without problems and have often proved to be risky ventures for the initiating buyer. The main constraint which they face is that most farmers are unfamiliar with growing perishable produce for the market. For most small-scale farmers, whose main experience is of growing maize, sorghum, root crops and/or bananas, the growing of horticultural products as cash crops represents a major change in the small-scale farming enterprise on which the livelihood of their household depends. It involves a sharp change in terms of the cultural practices involved, the pest and diseases which must be combated, the perishability of the harvested crop, and the stringency of the quality requirements of buyers. Furthermore, even if the price is agreed in advance of planting and they have complete confidence in the buying enterprise, they may still face a price risk if the new crop replaces a staple food commodity which they must now buy on the open market. Adjusting to growing fruits, vegetables and flowers as cash crops requires a change in the mindset of subsistence farmers if they are to appreciate the potential benefits of the new activity and also to accept the more demanding cultivation and management practices.

Thus there is a strong case, especially in the early phases of Rwanda's expansion of commercial horticultural production, for buying enterprises to establish one or more nucleus estates in areas that have high potential for small-scale production of the crop involved. By managing its own nucleus estate, the buying enterprise will be confident of an assured minimum supply of the crop. In turn, the estate can both be used to demonstrate to farmers that the crop can be grown profitably under local conditions and to serve as a focus for the demonstration of cultural techniques. The on-site presence of the manager of the estate and technical support staff will further allow ready access of farmers to urgent advice when they, for example, suffer outbreaks of pests and diseases or are uncertain about the optimal time at which to harvest. There will also be potential for cost savings through bulk purchase and storage of inputs for use on the estate and by outgrowers and through joint use of post-harvest equipment.

In addition to the support referred to above to develop contract farming in general, policy will be to explicitly encourage processors and traders to set up one or more nucleus estates as part of the establishment of contract farming arrangements with outgrowers. To this end the government will:

- using the provisions of the ALUCD, develop a land bank comprising parcels of land in areas suitable for the growing of selected horticultural crops;
- publicise the existence of this land bank within Rwanda, regionally and internationally;
- simplify and reduce the delays involved in the process of leasing rural land, including reducing the number of steps and the offices to be visited;
- assist in linking cooperatives with private investors interested in buying their produce on a contractual basis;
- establish separate national unions of cooperative societies engaged in the production and/or processing of (a) vegetables, (b) fruits and (c) flowers, with the aim, *inter alia*, of facilitating the above linking;
- establish a clear structure of incentives for private enterprises setting up nucleus estates, including measures to reduce the risk they face in the initial years of operation, such as the subsidisation of the seed/planting material and other inputs which they provide to farmers as credit in kind.

4.2.3.5 Clustering, horticulture hubs and buying centres

As the domestic horticulture market develops, there will be a natural tendency for enterprises, both within value chains and which support activities within such chains, to locate near the source of production or near important domestic markets and border crossing points that lie on routes to markets in neighbouring countries. Such natural, market-driven clustering will be encouraged through the public provision of infrastructure and the facilitation of access to building land as the cluster develops. As a general principle, government will not pro-actively aim to establish horticulture hubs either through public investment or heavy subsidisation of private investment, since this carries a high risk of establishing capacity that goes unused or operates at well below capacity.

The government will however support donors and NGOs that are prepared to finance commercial ventures that have potential but in which private investors are as yet not prepared to invest due to the risk of embarking on an untried activity. Once established as profitable such ventures will be privatised.

4.3 Policies to develop production for sale beyond the East African region

4.3.1 Factors affecting comparative advantage

It is widely agreed that Rwanda has the physical potential to grow a wide range of high value horticultural crops and flowers. Over the country as a whole, climatic and soil conditions combine to make the physical environment for producing such crops as good or better than that of other countries in eastern Africa, including the two most successful exporters of fruits, vegetables and cut flowers, Kenya and Ethiopia. Since the production of most horticultural crops is labour intensive, Rwanda's surplus of rural labour should allow unit costs up to the farm gate to be as low or lower than in competing countries.

Such excellent growing conditions and potentially low production costs are necessary but not sufficient to give Rwanda a comparative advantage in the growing of crops for export to international markets. The scope for developing each crop that can be successfully grown into profitable export earners depends not only on their suitability for production but also on **the competitiveness of their entire value chain from the supply of inputs and services to farmers through to the points of sale to foreign buyers in Europe, the Middle East and south Asia.**

To be competitive in international markets, Rwanda must overcome the following constraints:

- the land available to potential investors in horticultural production is scarce due to the small size of the country and its high population density;
- despite the high-quality of natural growing conditions, per-hectare yields tend to be low due to a low use of purchased inputs and sub-optimal methods of cultivation;
- many of the varieties currently being grown domestically are not suited to international markets;
- the quality of domestic production is generally below that acceptable on international markets;
- production and post-harvest activities are typically not undertaken using the practices and with the traceability necessary to meet the official government standards of importing countries or the commercial standards of importers;
- there are inadequate logistics chains from the farm-gate to the point of export, including a lack of packing stations and cold storage;
- the nation is landlocked, which makes sea transport more expensive than for a number of competing origins;
- compared with regional competitors, especially Kenya and Ethiopia, direct airfreight options to Europe are limited;
- the difficulty of entering distant foreign markets where links have yet to be forged with buyers, especially when competing countries are well established in these markets.

4.3.2 Addressing Constraints

Although Rwandan exporters have managed to export small amounts of horticultural commodities to Europe in recent years, achieving a very rapid increase in horticulture and floriculture exports to international markets can only be achieved by attracting foreign investors which already have experience of growing or assembling such crops for export in bulk and have established markets in

Europe, the Middle East and/or South Asia. To address the full set of constraints faced by Rwanda and to exploit the country's physical advantages to the full, foreign investors will need to establish efficient contract farming arrangements and have the possibility of effectively establishing one or more nucleus estates, as discussed above in sub-sections 4.2.3.3 and 4.2.3.4. In addition, it will be important that the government takes a set of actions to maximise the success of each venture as follows:

Adaptive research. Spread over its four main research stations, Rwanda currently has only ten staff specialising in horticulture research, none of which has a PhD and none of which is a plant breeder. It will be necessary to expand significantly the horticulture and floriculture research capacity of RAB to a level commensurate with horticulture's planned future importance within the agriculture sector. To prevent expensive failures and to reduce the risk faced by growers, new varieties suited to international market requirements will need to be tested systematically prior to commercial exploitation in potentially suitable areas. Extensive research will also be needed into optimal cultural practices under Rwandan conditions, including effective organic practices. While it is preferable for Rwanda to adapt and utilise varieties from abroad, there may be a case for breeding improved varieties of native flowers such as *agapanthus*.

Seeds and planting material. An essential requirement for a rapid expansion of horticultural output will be an adequate supply of seeds and planting material. For vegetables, the policy will be to rely principally on imported seeds of varieties that have proved in other eastern African countries to be suited to growing conditions similar to those in Rwanda and which are being exported successfully from these countries to markets in the EC and Middle East. For fruits, the policy will be to ensure that sufficient seedlings to meet demand are produced in specialist nurseries operated by the private sector and located in the main growing areas. For crops such as pineapple, tamarillo and passion fruit, seedling production has proved a potentially profitable labour intensive venture that is ideally suited to women's groups and cooperatives. The government will review present procedures for certifying the output of such organisations and will reduce registration requirements to the minimum necessary to assure that the output of seedlings is suitable for farms in the area concerned. For grafted seedlings, this will require focusing certification on the mother orchard. RAB will promote the adoption of improved techniques such as the grafting of passion fruit and macro-propagation of pineapple suckers. Where mother orchards have been established under a donor project that has terminated, RAB will ensure that priority is given to financing the continued upkeep of these orchards. In the case of summer flowers, such as *agapanthus* and tube roses, new varieties currently being exported from Kenya are generally more suited to market demand in the EU than those being grown in Rwanda. Where this is the case it will be essential that these new varieties be acquired and made widely available to Rwandan growers.

Infrastructure. The extensive ongoing investment in domestic infrastructure, including in roads, irrigation, and the rural penetration of electricity and ICT networks, will all increase the viability and competitiveness of export horticulture and floriculture. In addition, it will be necessary to invest in pack houses and cooling facilities. Policy will be for such investments to be implemented by the private sector. Where private investment is not forthcoming or where economies of scale dictate that there be only one facility, such as a single cold store at the international airport in Kigale, the government will invest in the facility, where possible as a PPP. Such facilities will be operated privately under a competitively awarded management contract.

Leveraging the Agricultural Land Use Consolidation Decree. It will be essential that the measures to utilise the provisions of the ALUCD contained above in sub-section 4.2.3.4 are all fully implemented to ensure that foreign as well as Rwandan investors have ready access to suitable land on which to establish a nucleus estate. Of particular importance will be the creation of a land bank and wide regional and international publicity of its existence, its purpose and the steps which foreign investors must take to can gain access to it. Care will be taken to ensure that the acquisition of land for the bank will be done with the full consent of the owner and with adequate compensation.

Partnerships between foreign investors and domestic investors and farmer associations. In addition to foreign investors entering into contractual relationships with farmers, farmer organisations and domestic investors, policy will be to encourage joint *ownership* of enterprises within horticulture value chains. This will give the foreign and domestic parties a joint interest in the success of the venture, will increase the capital available, will spread the risk involved in establishing a new venture, and will allow both parties to gain from the skills and experience of the other.

Public investment in export ventures and public private partnerships. For crops for which relatively large investments in production and/or processing are required for viable production for international export, the government will consider making the first of such investments to demonstrate to potential foreign investors that such investment can be commercially viable in Rwanda. To the extent possible, these pilot investments will be made together with investors which have experience in other countries of successfully producing and exporting fruits, vegetables or flowers to international markets. For crops for which relatively large contiguous pieces of land supplied with basic infrastructure are required, the government will cooperate with potential investors to identify and make available such land and to establish the necessary infrastructure. A first pilot of this nature is currently being undertaken for exotic cut flowers (roses) for which the government has cleared plots of land and installed basic infrastructure. Feasibility studies will be undertaken to demonstrate the viability of the venture to interested enterprises. The design of future pilots for other crops will take account of the experience gained.

Packaging. There is currently no packaging industry in Rwanda. The government will seek to establish a domestic packaging plant as a public private partnership (PPP) with a foreign packing company. The aim will be to provide the basic packing material for air-freighted fruits and vegetables and a set of standard packages to be used by Rwanda's fruit processing enterprises. Horticultural processors are currently handicapped by the government's ban on the use of polythene, which forces domestic processors to pack in imported bottles or expensive multilayered cartons. Consideration will be given to relaxing this ban to allow the use of polythene by processors of horticultural products. Such a relaxation would be accompanied by legislation to make the recycling of packaging compulsory.

Certification. As a minimum, exportation to the European market requires Global G.A.P. certification of the exported product. This is designed to ensure that imported goods have been produced using good agricultural practices. Certification requires that farmers and other actors within the domestic value chain undertake a detailed set of agricultural practices as specified by the certifying agency. Following these practices adds directly to the FOB unit cost of the product as do the fees of the certifying agency. These fees are currently exceptionally high in Rwanda since there is no approved domestic certification agency. This necessitates using agencies with offices in other

countries within the region. In addition to basic Global G.A.P certification, higher prices can be obtained through the additional certification of produce as organic or as having been 'fairly traded'. Organic production may result in lower yields and more produce with defects caused by pests and diseases. Both organic and fairtrade certification add further to unit costs. Thus, higher retail prices in importing countries for products with such certification does not necessarily translate into greater profits within the value chain in the producing country. Thus, for all crops targeted at the EU market, policy will be focused on ensuring Global G.A.P. certification at the lowest possible unit cost. The benefits of other certification will be evaluated on a crop-by-crop basis. To reduce the cost of Global G.A.P. certification, the government will work with exporters to encourage one of the main certifying agencies to establish an office in Rwanda.

Airfreight rates. Since KLM withdrew its scheduled freight flight to Amsterdam, there have been no dedicated airfreight flights to Europe. Cargo space on existing direct passenger flights to Europe tends to be expensive. However, Turkish Airlines has introduced a rate for cargo sent on passenger flights to Europe via Istanbul which is reportedly competitive with the cost of direct airfreight from Nairobi and Addis Ababa that are incurred by Rwanda's main potential competitors in Kenya and Ethiopia. The government will continue to seek to negotiate favourable rates with airlines, with the ultimate aim of making charges for direct airfreight to Europe competitive with those for Kenyan and Ethiopian fresh produce.

Surface transport. The planned opening of a new rail line running from Kigali to Mombasa via Kampala is expected to reduce significantly the cost of surface transport to markets outside eastern Africa. This rail link is scheduled to be completed in 2018, at the end of the present planning period. To ensure that the horticulture sector follows an efficient long-term growth path, it will be vital that the future potential for exporting the less perishable fruits and vegetables grown in Rwanda by rail and sea be embodied in the crop selection process detailed below.

4.3.2.1 Crop selection

Crop characteristics. The characteristics that increase the likelihood of a crop that grows well in Rwandan soil and climatic conditions being viable for production for international export are as follows:

TABLE: 7: Characteristics that make crops suitable for international export from Rwanda

Crop/product characteristic	Reason for suitability to Rwandan conditions
High value added per unit of land	Little unutilised potentially arable land.
High labour use per unit of labour	Labour surplus in rural areas; high level of poverty amongst rural landless households.
Production has low management requirements	Suitable for production by small-scale farmers on scattered plots.
Low perishability of the fresh crop	Suitable for a landlocked country with limited direct access by air to international markets; processing can be continued beyond the immediate post-harvest period.
Low perishability of the products derived from the crop	Does not need to be exported rapidly by air
High value to weight and volume of the fresh and/or processed product	Can be transported over long distances at a cost that is low relative to its FOB value.
High value added between the farm-gate and FOB	Can be transported over long distances at a cost that is low relative to its FOB value.

Processing and packing are labour intensive	Labour surplus in rural and urban areas; high level of poverty amongst rural landless households.
Processing and packing does not require sophisticated or high-cost equipment	Allows small-scale processing and packing in the production areas; equipment can be manufactured domestically raising domestic value added; lower investment costs and less risk for the processor.
The crop and/or products derived from it are already consumed in accessible developed markets	A new market does not have to be created; the existing market can be accessed by outcompeting present exporters.
Foreign markets that do not have excessively high quality requirements are available	Suitable for production by small-scale farmers used to growing crops for domestic consumption and with no experience of export horticulture.

Since 2009, there have been four donor-funded studies that have sought to identify the Rwandan horticulture crops that are most suitable for international export. However, as yet there is no consensus within government on a definitive short list. A major reason for this is that no well established value chains exist for these crops and it is therefore difficult to project how viable production for export would be in practice. The outcome is that both domestic entrepreneurs and foreign firms are making scattered attempts to set up businesses with *ad hoc* support from the government and donor projects. Some of these have met with limited success, others have largely failed. In most instances the main problem has been the difficulty of obtaining a consistent supply of high quality output from small-scale farmers.

The list of crops that have been identified as 'possibles' is lengthy: (a) baby vegetables including snow peas, (b) 'Asian vegetables' (i.e. vegetables imported into Europe for the diaspora of south Asian countries, principally India and Pakistan), (c) chillies (fresh and dried), (d) French beans, (e) mushrooms, (f) dried cassava leaves, (g) pineapple (fresh and dried), (h) passion fruit and juice, (i) cape gooseberry, (j) avocado (fresh and oil), (k) apple bananas, (l) tamarillo, (m) mangoes, (n) macadamia nuts, (o) geranium flowers and dried patchouli leaves (both for the extraction of essential oils), (p) field-grown summer cut flowers, and (q) field and greenhouse-grown roses and other exotic cut flowers. In addition, as noted in sub-section 2.5, some ten years ago, the government supported by donors and NGOs strongly promoted the growing of *moringa oliifera* for the extraction of oil for export. Although this effort failed due to the lack of an export market, an enterprise located on the outskirts of Kigali is now successfully extracting *moringa* oil from seeds imported from Uganda and is successfully exporting this oil to the USA and Europe. This suggests that *moringa* should be added to the list of possible international export crops.

Derivation of a short list. Ideally, the selection of exports crops should be market driven. However, for each of the possible crops there remains uncertainty regarding the most suitable domestic growing areas, the best cultural methods, the likely level of yields, post-harvest costs (including losses), the best markets to target, and obtainable FOB prices. Consequently, leaving the choice of crop solely to potential investors would be likely to lead to a continuation of the present slow, faltering and inefficient development of the sub-sector. Instead the government, led by NAEB and supported by stakeholders, will pursue the following programme aimed at targeting and supporting rapid growth in the value of international exports of a small set of crops:

- From the above list of possible crops, a short list of some 6-8 potentially viable export crops will be identified using the crop characteristics listed above in Table 7 as filters. This will be

done at a two-day workshop at which stakeholders evaluate each possible crop based on notes prepared by NAEB on each crop's characteristics.

- International market assessments will be carried out separately for each selected crop to (a) assess the international market and market prospects for exports from Rwanda, (b) determine the location(s) and segments of the international market(s) which Rwanda should target, (c) assess the possibility of supplying at times of short supply from other origins, (d) determine the sanitary and phytosanitary legislation, certification and other conditions that must be met, and (e) estimate the costs and benefits of organic and other certification.
- These assessments will be used to arrive at a shortened final listing of crops to be piloted.
- The most suitable growing areas for each of the piloted crops will be identified, with RAB focusing on growing conditions and NAEB examining the practicality of the areas relative to the point of export or the likely location of processing plants.
- Each crop will be piloted on a site in each selected optimal growing area using contract farming arrangements as follows:
 - The pilot will be large enough to allow the exporter sufficient throughput to meet the minimum export amounts that can be viably shipped and to meet the minimum lot size conventionally acquired by importers.
 - The necessary consolidation of farmers' land for the pilot would be organised by MINALOC in liaison with NAEB and in consultation with farmers as would land for a nucleus estate run by the exporter, should this be part of the envisaged production model.
 - A well-publicised package of incentives would be established to offset the high risk borne by the exporter inherent in any such new venture. For example, in the first year there could be a 100% subsidy on seed and fertiliser imported by the exporter, reducing to 50% in the second year and to 0% thereafter.
 - Exporters would be selected competitively on the basis of a submitted business plan which would be centred on a contract farming arrangement with horticultural cooperatives and/or individual farmers. It is envisaged that the majority of interested exporters are likely to be Rwandan or Kenyan firms looking to expand and diversify their business.
- Successful pilots would be well publicised with a view to attracting additional investors and scaling up production.
- A reduced package of incentives would be provided to such investors, since they would face less risk than those involved in the initial piloting.
- The original package of incentives and subsequent packages would be financed through MINAGRI's budget, with possible donor support. The magnitude of the piloting exercise and the public financing would take account of the high priority accorded by the government to the rapid expansion of export horticulture.
- Donor programmes relating to international crops would be required to integrate their export horticulture piloting activities into the national piloting process.

5 Addressing the shortage of data and the lack of national capacity to undertake horticulture-sector policy analysis and formulate policy

5.1 Data availability and use

5.1.1 Production

There are no reliable national estimates of the seasonal or annual area, yield and production of each type of fruit and vegetable grown in Rwanda, other than for those made some six years ago in the 2008 National Agriculture Census. These are disaggregated by crop and by district. MINAGRI's annual crop estimates collect data for eight fruits and seven vegetables plus a total for 'others'. However, total estimates of area and production are made only for all fruits and for all vegetables, since the sample is insufficiently large to provide reliable data at the individual crop level other than for the main staple foodstuffs. Moreover, the estimates are not made for season C, which is important for vegetables. The present lack of annual time series on crop production by crop means that trends in the production of individual crops are not known, neither is the extent of instability in output from year to year. Seasonal patterns in the output of individual crops are also not known other than anecdotally.

NISR's 2013 Seasonal Crop Survey covered season C but also did not provide usable data on the production of individual horticultural crops. It also provided production data for vegetables and fruit that differed markedly from the data in MINAGRI's crop forecasts. The reasons for this will be investigated and MINAGRI will work with NISR to produce a single set of data supported by detailed metadata which allow informed use by analysts and commercial users of the survey's findings.

5.1.2 On farm consumption and post-harvest losses

The 2013 seasonal crop survey contains data on the mean percentage of each of the main vegetable and fruit crops which is consumed by the producing household, with separate data for small-scale producers and largeholders. MINAGRI will work with NISR to analyse the determinants of variations in auto consumption between farms and between crops.

There are no firm estimates of total national post-harvest losses of fruits and vegetables or of losses of individual crops. These losses are thought to be very high. NAEB will undertake a survey aimed at estimating losses by crop and establishing the main causes of these losses.

5.1.3 Regional trade

There are relatively detailed data on monthly formal cross border trade and estimates are also made of informal cross border trade. NAEB's Policy Division obtains these from the Rwanda Revenue Authority. The data are broken down by crop and by crossing point. They represent a veritable gold mine of useful data on the direction, size and seasonality of trade flows. NAEB will analyse these data.

5.1.4 Market prices

MINAGRI's eSoko system collects price data from a total of 61 markets, twice weekly for markets in towns and once weekly for village markets. A total of 78 commodities are covered by the system, including the main fruits and vegetables. For a small charge, prices at each market can be accessed by farmers and traders by mobile phone in the form of text messages. The aim is eventually to place eSoko's full database on line. The database has considerable potential for use in attempts to build up a picture of localised seasonal gluts and shortages, but as yet have not been utilised for this purpose.

5.1.5 Internal flows of produce

Data on internal trade flows is difficult and expensive to obtain, but it may be possible to develop an affordable system that would throw some light on the seasonal internal flows of horticultural produce by collecting and analysing data on the throughputs of the wholesale markets in Kigale and markets in Rwanda's main towns. NAEB will work with and support eSoko to establish a system for the collection of data on the weekly throughput of a selected subset of the 61 markets at which it currently collects price data.

5.2 Developing a capacity for horticulture policy analysis within NAEB

NAEB has a Planning Division that covers horticulture and the established export crops, tea, coffee, and pyrethrum. Its small number of staff are heavily engaged in planning for these crops and do not have the time to work on policy analysis. Consequently NAEB relies heavily on foreign consultants to undertake policy analysis, while its staff work mainly on operational issues.

The proposed new structure of NAEB has the Planning Division reporting to the Chief Operations Officer who is responsible for all of NAEB's crops. The division would be divided into two units. Its Planning Unit would have a Head, an M&E Officer, a Resource Mobilisation Officer, and two Statisticians. The second unit would be for ICT and would have five staff. Thus, there would continue to be no resources for in-house policy analysis and development.

Given the importance of the horticulture sector and its diversity, a permanent policy unit will be established within RAB's Horticulture Division, with the unit's head reporting to the Head of the Division.

The policy unit will develop a statistically based picture of the structure of domestic production, on-farm consumption, the movement of fruits and vegetables internally and across Rwanda's borders with neighbouring countries and to and from Kenya, and will document and plot the growth of the country's emerging international exports of fruits, vegetables and cut flowers. The data will not need to be perfect, rough orders of magnitude will be sufficient as an input into policy formulation.

Once the unit gains a good understanding of the sector, it will take a proactive role in national horticulture policy analysis and formulation, allowing these activities to be carried out on a continuous basis rather than through intermittent ad hoc inputs by consultants.

PART 2

STRATEGIC PLAN FOR IMPLEMENTATION OF THE NATIONAL HORTICULTURE POLICY

1 Introduction

The purpose of this Strategic Plan is to set out the means by which the National Horticulture Policy (NHP) will be implemented.

The Plan was developed through a set of steps involving *(list stakeholders who participated)* between *(month) and (month)*, 2014, during which an initial draft of the Plan was progressively refined. The development and drafting process was coordinated by NAEB

2 Overview of the Sector

2.1 Definition of 'horticulture'

The NHP employs the following working definition of 'horticulture':

- a. fruits, including fruit bananas but excluding all other bananas
- b. vegetables, excluding Irish potatoes
- c. cut flowers, both summer flowers and exotic flowers
- d. plants grown for the extraction of essential oils, other than pyrethrum
- e. macadamia nuts.

2.2 Sector status, potential and challenges

2.2.1 Sector Status

2.2.1.1 Importance and Structure

The NHP document assesses the importance of horticulture in Rwanda (sub-section 1.3) and contains a detailed situation analysis of the horticulture sector (Section 2). The key points that emerge from this are as follows:

- In 2013, horticulture accounted for an estimated 13 percent of agricultural gross domestic product (GDP) and 3.2 percent of national GDP.
- The main vegetables grown are cabbage, tomato and eggplant. The main fruit is fruit banana, followed by avocado, pineapple and mango. There is a small floriculture subsector, the output of which is largely limited to small amounts of cut summer flowers and roses.
- The available data suggest that, over the past 5-6 years, there has been a decline in the national area planted to vegetables and fruits, accompanied by a decline in national horticulture output.
- Most rural households grow horticultural crops, typically on a very small scale. An estimated 58 percent of farm households have a vegetable garden.

- The national area planted to vegetables and, especially, to fruits is difficult to estimate, but the combined area is probably in the region of some 6.5 percent of total cropped land.
- Small-scale production by individual households accounts for about 95 percent of national horticultural output. In 2013, collective production by members of horticultural cooperatives and associations accounted for an estimated 10.3 percent of national vegetable production and 1.6 percent of national fruit production. There were some 550 farms with over 0.5 ha planted to horticultural crops.
- Nationally, the per-hectare farm-gate value of horticultural output is substantially higher than that for crops as a whole.
- Approximately 95 percent of the nation's horticultural output is consumed domestically, mainly within the district of production. About one-third of national output is consumed on farm.
- Most marketing of vegetables and fruits is opportunistic and informal, with prices being negotiated at the time of sale at the farm-gate or at a local market. There is only a small amount of contract farming and little involvement of farmer cooperatives and associations in marketing, other than for produce grown collectively by their members.
- The only systematic movement of horticultural produce within the domestic market is by middlemen, who assemble consignments locally for sale in Kigali.
- The vast majority of Rwanda's international trade in horticultural produce is with neighbouring countries. This trade is dominated by vegetables, for which exports exceed imports. There is a small national import deficit for fruits. International exports to destinations outside the central and east African regions are very small. A significant amount of processed horticultural produce is imported.
- Most of Rwanda's vegetables and fruits are consumed in fresh form.
- In 2013, there were an estimated 258 processors of bananas and horticultural crops, over two-thirds of which produced wine and spirits from bananas. Most of the remainder produce natural fruit drinks. Small numbers of processors produce tomato paste and ketchup, natural oils, essential oils, and shelled macadamia nuts.
- Other than for cross-border trade, there is a lack of data on the horticulture sector, which hampers policy formulation and planning.

2.2.1.2 Sector segmentation

For the purpose of policy formulation, the NHP segments Rwanda's horticulture into three sub-sectors which need to be supported by different sets of strategies and actions:

Sub-sector (a): Production for home use and occasional sale.

Most horticulture producers currently fall into this sub-sector. Their production capacity comprises household vegetable gardens and small numbers of scattered fruit trees amongst which they plant annual crops. A substantial proportion of the horticultural output of this sector is consumed by the producing household, but such auto-consumption is lower than for the main staple food commodities.

Sub-sector (b): Production for sale in domestic and regional markets

This sub-sector comprises (i) small-scale farm households operating independently, which devote one or more of their plots to the production of horticultural commodities for the market, (ii) members of cooperatives and associations (hereafter 'organisations') which produce fruits or vegetables collectively, and (iii) 'largeholder producers' with over 0.5 ha devoted to open field horticulture. There are no data that allow estimation of the importance of this sub-sector relative to sub-sector (a) in terms either of production or marketed production. It would seem likely that sub-sector (a) produces substantially more than sub-sector (b), but that there is less difference between them in marketed output due to the greater importance of auto-consumption by households in group (a).

Sub-sector (c): Production for export to international markets

This sub-sector, which is currently very small, comprises mostly small-scale growers of vegetables, fruits and flowers who are organised and supported by exporters. Most of the output in this sub-sector currently comprises vegetables, but there is also a small amount of production of fruits, cut flowers and flowers and leaves for the extraction of essential oils. A single processor is supporting the establishment of *Moringa Oleifera*, from which it will extract oil for international export.

2.2.2 Sector Potential

Natural growing conditions in Rwanda are particularly suited to the production of horticultural commodities. Excellent quality soils and well distributed rainfall, coupled with variation in soil types and altitude, means that a wide range of vegetables, fruits and flowers can be grown, ranging from tropical fruits through to vegetables that thrive in temperate climates.

Compared with the production of Rwanda's staple food crops, horticultural production is more labour intensive and adds more value per hectare. Thus, employment and the value which is added within the agriculture sector can be increased by switching land from staples to the production of vegetables, fruits and flowers. The country's recent success in expanding staple food crop production provides potential for this, since such a switch will not compromise food security. Indeed, in the case of fruits and vegetables, it will improve human nutrition by increasing the availability of micronutrients required for a balanced, healthy diet.

Across the horticulture sector, per-hectare yields tend to be well below those that are potentially achievable due to sub-optimal input use, insufficient control of pests and diseases, and inadequate cultural practices.

There are no accurate estimates of the amount of national horticultural output which is lost after harvest, but it is widely thought that it is exceptionally high due to the perishability of fresh horticultural produce. Post-harvest losses are principally due to the seasonality of production and localised seasonal gluts coupled with inadequate marketing infrastructure and a lack of sufficient capacity to process surpluses into less perishable products. If these constraints can be addressed, losses will be reduced significantly, leading to a substantial increase in the amount of national horticultural production which is utilised domestically and exported.

There is potential to add further value to horticultural production by storing, grading, packing and/or processing prior to domestic consumption or export.

Thus, there is potential for the horticulture sector to make a strong contribution to GDP growth, employment creation and the improvement of the nutritional status of the population through:

- switching land from the production of staple crops to the production of high value-added, high-employment horticultural crops
- raising yields and value added on land currently planted to horticultural crops
- reducing post-harvest losses
- increasing the amount of value that is added to produce between the farm gate and points of domestic use and export.

2.2.3 Sector challenges

2.2.3.1 Increasing the efficiency of production

Per-hectare yield increase. Most horticultural production is skill and management intensive. The mean yields obtained in Rwanda are well below the potential that could be achieved. Given the high proportion of Rwanda's rural households that produce horticultural crops and the significant differences between crops in cultivation techniques, it will be a major challenge to ensure that all producers have the skills and technical support necessary to expand national output and raise value added per unit of land.

The high cost of imported inputs. Rwanda's small size plus the fact that it is landlocked make it particularly difficult to produce crops efficiently, especially horticultural crops, for which the national output of each distinct crop is necessarily relatively small. In the case of seeds and planting material, this makes the costs per unit of land planted of breeding or of importing and adapting varieties to local conditions exceptionally high. The cost of importing fertiliser is also high due to a lack of economies of scale in purchasing and the high costs of importing. This leads to high farm-gate unit costs for inorganic fertilisers and, in effect, precludes the use of specialised fertilisers with added nutrients.

2.2.3.2 Increasing the efficiency of domestic marketing

Inefficient and costly domestic marketing. Rwanda's hilly terrain means that small-scale farmers often have to travel long distances to acquire inputs and market their produce. It also means that farm households may have access to only one input stockist or rural market. Competition between stockists and between market traders is often limited, resulting in traders making excess profits at the expense of farm households. It will be a challenge to rectify this situation without the introduction of disruptive price controls.

2.2.3.3 Expanding processing

The high-cost processing. Rwanda's small size and the lack of an established manufacturing sector also hamper the development of the processing of horticultural crops. It means that all but the most basic plant and machinery have to be imported and that maintenance costs are high due to a lack of spare parts and a lack of experienced engineers and mechanics. This is less of a problem while labour costs are low, but will become a challenge that will need to be met as labour costs increase as Rwandan GDP per capita rises.

2.2.3.4 Exportation to international markets

Inappropriate varieties and inadequate quality. For some fruits and summer flowers, Rwanda produces traditional varieties for which there is less demand than for the new varieties that are currently being grown in competing countries. Rwanda faces the challenge of switching to these new varieties and also of establishing an efficient system for packing and transporting them from the growing area to the point of export with minimal damage and deterioration.

The high cost of transport to international markets. In addition to increasing production efficiency, a rapid expansion of horticultural exports to countries outside the region will require overcoming the challenges that Rwanda faces as a consequence of its landlocked location in sub-Saharan Africa and the fact that it is less well served by international airlines than competing countries, especially Kenya and Ethiopia, which will be its main competitors for cut flowers and also for most fruits and vegetables.

Small-scale farms and traceability requirements. The very small size of most farms and the lack of large unutilised tracts of land on which large horticulture farms could be established, means that large numbers of small-scale farm households must be involved in production for export to allow exporters to assemble viably-sized export consignments. For consignments to Europe this presents two challenges. First, the practices of small-farmers must be modified and raised to international standards. Second, to obtain GLOBALGAP certification and to meet the requirements of other certifying bodies, cost effective systems that trace products back to each farm must be established.

Late entry into international markets. Rwanda must successfully compete with other exporting countries that have well established markets in importing countries.

2.2.4 Institutional Overview of the Sector

The main Ministries and their Directorates for implementing the NHP will be:

- MINAGRI, especially NAEB and RAB and the four Zonal offices of RAB, each of which has its own horticulture programme.
- Ministry of Trade and Industry (MINICOM), especially the Directorates of Internal and External Trade.
- Ministry of Local Government (MINALOC), especially the General Directorate of Social Welfare and Community Development.
- Ministry of Finance and Economic Planning (MINECOFIN), especially the Budget Directorate.

Other ministries that will be involved in implementation are the Ministry of Health (MOH) and the Ministry of Infrastructure (MININFRA), especially its Transport Division.

3 The Strategic Framework

3.1 Mission and objectives

The implementation plan aims to fulfil the mission and achieve the objectives of the NHP.

3.1.1 Mission

The NHP's mission is to contribute to fast economic growth and rapid reduction in poverty and malnutrition, which are key elements of national development policy.

3.1.2 Objectives

To fulfil this mission, the NHP aims to:

- increase the value which is added domestically within the horticulture sector, and improve the efficiency of such value adding,
- increase the access of poor households to fruits and vegetables and improve the nutritional efficiency of fruit and vegetable use within poor households, and
- raise net export earnings from trade in fresh and processed horticultural produce, thereby easing the foreign exchange constraint on national economic growth.

3.2 Contribution to EDPRS 2 and PSTA III

Horticultural crops mostly yield fewer calories per hectare than staples, such as cassava, maize and cooking bananas, but provide greater employment and add more value. They also contain micronutrients that are essential for a balanced diet. The success in expanding the national production of staple foodstuffs during the prior planning period, has paved the way for now giving greater emphasis to the production of horticultural food crops. The employment and value-adding characteristics of horticulture mean that the planned rapid expansion of the horticultural sector will contribute strongly to the objectives of EDPRS 2 and PSTA III that relate to economic growth and the reduction of poverty and malnutrition.

The NHP sets out in detail how it will contribute to meeting the objectives of EDPRS 2 and PSTA III.²¹

4 Translating Policy into Action

4.1 The complexity of the horticulture sector

Rwandan horticulture is more diverse and complex than other agricultural sectors in that it embodies a large number of crops, both annual and perennial, between which there are marked differences in the production characteristics and in the physical characteristics of the harvested crop. There also tend to be greater options in terms of processing than for both Rwanda's staple food crops and its main export crops, tea, coffee and pyrethrum. In common with Rwanda's other food crops, there are also significant differences between producing households in the proportion of their

²¹ Part 1 Section 1.5.

horticulture output which is consumed on farm and marketed. Furthermore, for horticulture, a national objective is to expand export earnings rapidly through very large increases in the international export of vegetables, fruits and flowers. Given the small size of such exports at present, this, in effect requires the establishment of a set of new value chains.

4.2 Derivation of the logical framework

The National Horticulture Policy seeks to address this complexity of the horticulture sector by dividing it into subsectors that involve (a) production for home use and occasional sale, (b) production principally for the domestic and regional markets, and (c) production for sale beyond the East African region. Sub-section 3.3.2.1 of Part 1 of this document examines the mechanisms by which each of the three sub-sectors can play a part in achieving the Policy's ultimate goal of contributing to fast economic growth and to a rapid reduction in poverty and malnutrition. The policy measures necessary to ensure that these mechanisms are efficient and effective are then identified (Part 1, Section 4).

These activities are presented in Annex 1 in a conventional logical framework (logframe). The first column shows the full set of planned activities and how their implementation will lead to outputs, outcomes, and ultimately achieve the goal of the NHP. The framework also shows the lead agency responsible for each activity, the event(s) or variable(s) that will be used as an indicator to monitor the activity, the organisation that will be responsible for this monitoring, and the assumed prerequisites for actions to have the intended output.

To prevent the logframe) from becoming overcomplicated, it is assumed that a set of activities lead to an output, that a set of outputs lead to an outcome, and that a set of outcomes leads to the final goal. This provides only a partial picture of the means by which the planned actions will achieve the goal, since many of these actions will lead to two or more of the outputs, and some of the outputs will lead to more than one of the outcomes. Each action has been placed under the output with which it has the most direct link and/or where its contribution to the output would seem likely to make the greatest contribution to achieving the goal. Take output 1.1 for example: *An expanded domestic capacity to undertake effective horticulture research*. This output has been allocated to Outcome 1 which relates to the expansion of domestic value added. However, the output will also contribute to meeting the NHP goal by other routes, for example by (a) raising the output of poor households and therefore their access to fruits and vegetables (Outcome 2) and (b) accelerating growth in national net export earnings (Outcome 3). While it is impossible to present such linkages in a simple logframe, the possibility of their existence and the additional impact must be borne in mind.²² For this reason, it will be important during implementation to refer back to the discussion of activities in the NHP contained in Part 1 of this document.

The difficulty of showing all such linkages within a two-dimensional table detracts from the utility of the logframe as a means of demonstrating all the linkages in a results web. However, the logframe still serves as an important planning tool, since it sets out the planned actions within a framework

²² Output 1.5: *Reduced local and national seasonal gluts* is good example of the complexity of linkages. This output is one means of improving marketing efficiency, which is output 1.4. At least one action under output 4.1 (Action 4.5 aimed at reducing losses in rural markets) would tend to worsen market gluts by reducing wastage and making local and national supply higher than it otherwise would have been.

that shows the strongest direct linkages and also documents the responsible lead agencies, identifies indicators and lists assumptions.

4.3 Outputs and outcomes

The goal of Rwanda's horticulture policy is to contribute to fast national economic growth and to a rapid reduction in poverty and malnutrition. This will be achieved through a total of 62 activities that will lead to 17 outputs, which, in turn will lead to four outcomes. The activities to achieve the outputs that will lead to Outcomes 1 and 2 will be mutually reinforcing and most can be undertaken simultaneously. The outputs leading to Outcome 3 are part of a process and will be implemented sequentially. The actions leading to Outcome 4 will be initiated immediately.

4.3.1 Outcome 1: Progressive increase in the value which is added domestically within the horticulture sector and progressive improvement in the efficiency of such value adding

This outcome is likely to make the largest contribution to the goal since it relates to the entire sector and because the actions necessary to attain it will also contribute to the attainment of Outcome 2 and to the efficiency with which value chains are established and developed through the actions under Outcome 3.

The activities under Outcome 1 are designed to:

- expand and increase the effectiveness of horticulture research
- ensure that horticulture is integrated fully into the Twigire extension system
- improve the capacity of farm households to acquire seed, inorganic fertiliser and other inputs
- improve the efficiency of domestic horticulture marketing
- reduce local and national seasonal gluts of horticultural produce
- make horticultural value chains more efficient through the expansion of contract farming involving farmer organisations
- increase domestic value adding through an increase in processing and other post harvest activities and improvement in the efficiency with which these activities are carried out.

4.3.2 Outcome 2: Progressive increase in the ability of poor households to acquire fruits and vegetables and progressive improvement in the efficiency of fruit and vegetable use in poor households

Progressive increase in the ability of poor households to acquire fruits and vegetables will result principally from increased and more efficient small-scale production that will stem from the actions listed under Outcome 1. In addition, to reinforce these measures and to ensure that vulnerable households utilise the food which they acquire efficiently, there will be a set of activities aimed explicitly at those households thought to be most susceptible to malnutrition.

4.3.3 Outcome 3: Rapid growth in net export earnings from trade in fresh and processed horticultural produce

To achieve this outcome, the activities and outputs are aimed principally at:

- identifying a small set of vegetables, fruits, flowers and other horticultural crops that have the potential to be exported profitably to international markets
- identifying optimal growing locations for each of the identified crops
- creating an environment which will attract enterprises to take the lead in piloting the establishment of one or more value chains for each of these crops
- competitive selection of suitable lead enterprises
- monitoring the performance of each value chain
- supporting the enlargement and replication of the value chains that are successfully established

4.3.4 Outcome 4: Increased national capacity to undertake improved horticulture-sector policy analysis and planning

This outcome will be achieved through improving the coverage, consistency and analysis of data relating to the horticulture sector and by increasing NAEB's policy analysis capacity.

5 Implementation of the sector strategic plan

5.1 Sequencing of interventions

The activities in the plan will be mutually reinforcing. However, most of the activities contained in the plan are not prerequisites for other activities and consequently can be undertaken simultaneously.

There are a number of priority activities which must be undertaken at the start of implementation, either because other activities in the plan are dependent on them or because, once completed, they will enhance the output of other activities. In addition, it will be essential to sequence the activities aimed at expanding international exports, since each represents a separate step in the process of establishing a set of efficient and effective international export value chains.

5.1.1 Priority activities

A functioning NAEB HPU (Output 4.2) is a prerequisite for effective implementation of at least seven of the Plan's activities. The three activities necessary to achieve this outcome will all commence at the start of implementation.

It will also be essential for implementation that Rwanda has a greatly expanded capacity to undertake horticultural research (Output 1.1). The two activities necessary for this will also be initiated at the start of implementation.

Outcomes 1 and 2 are critically dependent on the effective establishment and operation of the new Twigire extension system. The process of establishment commenced some two years ago. Throughout the remainder of the establishment period, importance will be accorded to (a)

accommodating extension activities relating to horticulture and (b) using extension groups in the acquisition of inputs for horticultural crops and in the marketing horticultural products.

Improved seedlings and perishable planting material supplied from local sources must be available from early in the programme. To ensure this, priority will be given to the first three activities aimed at improving farmers' ability to acquire inputs (Output 1.3)

5.1.2 Sequencing of activities to expand international exports

Outputs 3.2 to 3.7 are designed to accelerate the growth in the export of horticultural produce to international markets. The activities contributing to each of these outputs can only be undertaken once the prior output has been achieved, and will be sequenced accordingly. The activities within each output will also be sequenced in the order in which they are numbered. Action 3.3.2 will contribute to encouraging investors in the less perishable crops to be and consequently has been allocated to Outcome 3.3. However, it would also be a useful input into the selection of the crops to be piloted (Outcome 3.1) and ideally will be carried out at the start of the export development process. It has not been placed at this stage, to prevent the possibility of a delay in its preparation delaying the selection process.

5.2 Roles and responsibilities of stakeholders in the sector

5.2.1 Roles of central and local government

NAEB will be responsible for overall implementation of the plan and for the coordination of the development of value chains for Rwandan horticultural crops and products exported to international markets (see sub-section 5.2.5, below).

Actions relating to production and post-harvest activities undertaken on the farm will be the responsibility of MINAGRI and MINELOC, with NAEB and RAB spearheading implementation, working closely with local authorities. NAEB will focus principally on actions relating to international export value chains, with RAB focusing on household vegetable gardens and commercial production for the domestic market.

The new Twigire national extension system will play an important role in delivering outcomes 1 and 2. To ensure that horticulture, including export horticulture, is included effectively in the Twigire system, a representative of NAEB will be a member of each Zonal Agriculture Committee and of the National Agriculture Technical Committee.

MINAGRI and MINALOC will work closely with MOH in the provision of technical assistance on food preparation to households vulnerable to malnutrition. MINEDUC will be responsible for extension activities implemented through schools and colleges. Actions relating to marketing and processing will be overseen by MINICOM and implemented by MINICOM, MININFRA and MINELOC. Incentive packages will be designed by NAEB and will be evaluated, modified (if necessary) and provided by MINECOFIN. MINAGRI and MINELOC will liaise with MININFRA to ensure that public investment in roads and market infrastructure takes full account of the needs of agricultural marketing, including those of the horticulture sector.

NAEB's HPU will be responsible for ongoing policy analysis relating the horticulture sector. MINAGRI's eSoko, in liaison with the HPU, will expand its market survey to include weekly

throughput of horticultural produce. MINAGRI and NISR will work together to harmonise their estimates of national horticulture production.

Donors will make a major contribution to the financial costs of implementation, either through grants to the government earmarked for supporting the plan as a whole or through projects that contribute to specific activities. NAEB, RAB and MINICOM will ensure that donors and NGOs that are supporting activities that fall within the Plan are aware of the planned sequencing of activities and of the importance of complying with this sequencing.

5.2.2 Role of the private sector

Virtually all horticulture production, processing and marketing is currently undertaken and will continue to be undertaken by farm households, cooperatives and enterprises operating in the private sector. The NHP is designed to incentivise, support, guide and regulate private sector activity. The Plan aims to ensure that this is done in a cost effective manner.

Where implementation of the plan involves new activities that involve excessive risk, the initial investment in such areas will be undertaken by public-private partnerships (PPPs). If such partnerships cannot be formed, the government will make the first investment. The Government will seek to privatize all such ventures at the earliest possible date, including those involving PPPs.

5.2.3 Role of horticulture organisations

Horticulture associations and cooperatives are expanding rapidly in number. To date, most such organisations engage in the collective growing of horticultural crops. Future public support for the creation and development of horticulture organisations will focus on organisations that engage in (a) the marketing of members' produce, especially as a part of a contract farming arrangement, and (b) the processing of the output of their members and/or of crops purchased from non-members.

5.2.4 Roles of civil society and other organisations

Bilateral and multilateral donors will play an important role in financing the plan. Much of this finance will be provided through ongoing and new projects that, *inter alia*, provide foreign specialists who will both supplement the pool of national specialists and provide a vehicle for introducing and helping disseminate international best practice. Mid-term and final evaluations of donor-funded projects will make a valuable contribution to the evaluation and fine-tuning of the Plan activities which they are supporting.

International and national NGOs and religious establishments have to date provided extensive support to activities relating to the production and use of horticultural commodities. This support has focused on household vegetable gardens and on effective utilisation of home produce. Continued NGO support in these areas consistent with the Plan will make an important contribution to Outcomes 1 and 2.

5.2.5 Coordination of the establishment of new value chains

The majority of activities will require coordination within government and between government agencies, individual entrepreneurs, private enterprises, cooperatives, farmer associations, donors and civil society organisations. Cooperation will be a particular challenge for the development of

international export value chains, especially those that involve production for supply to export markets that are new for Rwanda. It will be essential that:

- from the first main harvest onwards, there are remunerative markets for the entire marketed output of crops grown for international export, including output that is not of export quality and must be sold on the domestic market;
- newly established processing and packing capacity does not lie idle for the want of sufficient raw material; and
- from the start, Rwanda's international exports comprise produce that is of consistently high quality, traceable back to the producer, and supplied to the quality specification and delivery schedule contracted with buyers.

Meeting these requirements will need meticulous planning, sequencing and coordination of activities along the entire value chain from the supply of inputs and services to farmers through to the point of sale in the final market. This, in turn, will require cooperation between entities involved in activities at adjacent stages of the chain, such as farmers and processors, and between entities operating at non-adjacent chain stages or supporting the chain through, for example, research into the quality requirements of final markets and domestic seed selection. Some of the coordination will be organised on a commercial basis, for example, through contract farming, but some will require coordination between public entities or between public entities and commercial enterprises.

5.3 Mechanisms for coordination and information sharing

NAEB will circulate hard copies of the final draft of this document to all directors and deputy directors within MINAGRI and to all Ministries that will be involved in implementation. NAEB, RAB and MINAGRI will give prominence to the document will make it available on their websites in the form of a PDF file.

Coordination Plan actions and the sharing of information will rely, to the extent possible, on mechanisms that are already in place and functioning. Key among these will be the the Agriculture Sector Working Group (ASWG), which both reviews achievements against targets and serves as a forum for discussion and information sharing. The ASWG is chaired by MINAGRI and co-chaired by the European Union Delegation. It's members includes MINAGRI, other ministries, government agencies, producer organisations, multi-and bilateral donors, NGOs, private sector bodies, and academics. MINAGRI has established a Public Private Sector Partnership Forum to bring together public and private stakeholders involved in the agriculture sector.

To the extent possible, activities in value chains for horticultural produce will be coordinated by the individuals and enterprises that grow and own the commodity as it moves down each chain and by other private-sector actors who provide goods and services to them, such as input suppliers, transporters and certifying agencies. However, there will also be a need for coordination between ministries that are responsible for different stages of chains, especially MINAGRI (production) and MINICOM (processing and trade).

Coordination will be particularly important for newly established chains that are initiated by enterprises formed as public private partnerships. It will also be necessary to ensure that crop

research takes account of the need to exploit seasonal price variation in destination markets and of the crop characteristics demanded by processors and foreign buyers, including crop size, taste, uniformity and storability. To facilitate this coordination, NAEB will establish and chair a Horticulture International Export Working Group (HIEWG) that will support the development of nascent and new horticulture value chains for horticultural crops exported to international markets. In addition to NAEB, membership of HIEWG will comprise the RAB Deputy Director General for Research and for Agriculture Extension, representatives of MINICOM responsible for internal and external trade and SME development, a representative of the Rwanda Cooperative Agency (RCA) and of donors and NGOs which are supporting international export value chain development. HIEWG will have sub working groups specialising in (a) vegetables, (b) fruits, (c) flowers (d) essential and other speciality oils, and (e) macadamia nuts. Each sub working group will, *inter alia*, have representatives of the PPPs or other enterprises that are at the forefront of leading the development of value chains for the type of horticultural produce covered by the sub group. Most of the coordination work will be done by these sub working groups. Each such group will report regularly to HIEWG, which will focus on coordinating the work of the groups and addressing topics which cut across value chains.

6 Monitoring and evaluation

7 Costs and financing

Annex 1

National Horticulture Policy Implementation Plan: Logical Framework

GOAL: The national horticulture sector will contribute to fast national economic growth and to a rapid reduction in poverty and malnutrition				
Outcomes, Outputs and Activities*	Lead Agency	Indicator(s) and (means of verification)	Assumptions**	
<p>OUTCOME 1: Progressive increase in the value which is added domestically within the horticulture sector, and progressive improvement in the efficiency of such value adding.</p>		National horticulture farm-gate value at constant prices used as a rough proxy for value added. (NAEB HPU estimates).	The Rwf will not revalue significantly in real terms against the currencies of its main trading partners.	
<p>OUTPUT 1.1: An expanded domestic capacity to undertake effective horticulture research.</p>				
<p>1.1.1 Establish a participatory system to identify horticulture research needs and to trial research station recommendations in farmers' fields.</p>	MINALOC, NAEB, RAB	System established and assessed to be operating effectively. (Joint MINALOC/RAB/NAEB report).	The Twigire extension system will be successfully established and fully financed.	
<p>1.1.2 Establish an increased horticulture research capacity by (a) expanding the staffing establishment of horticulture experts at MINAGRI research stations and filling all established posts, and (b) equipping and financing the stations for horticulture research.</p>	RAB, NAEB	Staff establishment increased with at least two staff trained to PhD level. % of newly established posts filled. Budget line for horticulture research established and financed. (RAB report).	Sufficient persons with the necessary skills are available.	
<p>OUTPUT 1.2: An effective extension system which adequately covers horticulture and reaches all interested farmers.</p>				
<p>1.2.1 Establish a system for ensuring that horticulture research findings are fed effectively into the new Twigire extension system.</p>	RAB, MINALOC	System established and working effectively. Adoption of research recommendations. (Joint RAB/MINALOC report).	The Twigire extension system will be successfully established and fully financed.	

1.2.2 Ensure that trainers at each level within the Twigire extension system have good knowledge of cultivation and post-harvest techniques for the main horticultural crops.	MINALOC, NAEB, RAB	Percentage of trainers at each level trained in horticulture. (Joint MINALOC/RAB/NAEB report).	The Twigire extension system will be successfully established and fully financed.
1.2.3 Permit farmer extension groups to select single horticultural crops as 'priority crops'.	MINALOC, NAEB, RAB	Numbers of extension groups that have selected one or more horticultural crops as priority crops. (MINALOC report).	Incentives no longer encourage the growing of maize, beans and other stable food crops rather than horticultural crops.
OUTPUT 1.3: An improved capacity of farm-households to acquire certified seeds, other planting material and high quality agricultural chemicals at the time that they are needed.			
1.3.1 Support women's groups and cooperatives to establish as commercial ventures nurseries that produce seedlings and other planting material for fruit crops; simplify the procedure for certifying the output of these organisations.	NAEB, RAB, RCA	Number of such organisations established. (RCA report).	The existence of sufficient local demand to support commercial production.
1.3.2 Simplify the procedures for certifying the output of seeds and planting material produced by women's groups and cooperatives.	NAEB, RAB, RCA	Certification simplified. (NAEB report).	-
1.3.3 Give priority to financing the maintenance of fruit tree nurseries established under donor projects that have terminated; privatise such nurseries where feasible.	NAEB, RAB	Public expenditure on nurseries. Number of public nurseries privatised. (NAEB report).	Rehabilitation of neglected nurseries has the potential to be cost effective.
1.3.4 Use extension groups as a catalyst for group acquisition of inputs for horticultural production.	MINALOC, NAEB, RAB	Number of extension groups engaging in the group acquisition of horticulture inputs. (MINALOC report).	The Twigire extension system will be successfully established and fully financed.
1.3.5 Subsidise inorganic fertilisers used on horticulture at the same rates as for CIP crops.	MINAGRI, MINECOFIN	Weight of fertiliser distributed for use on horticultural crops. (MINAGRI report).	A practical and effective system for subsidising non-CIP crops can be established.
OUTPUT 1.4: An improvement in the efficiency with which horticultural produce is marketed within Rwanda.			
1.4.1 Use extension groups as a vehicle for the group marketing of horticultural produce by farmers.	MINALOC, NAEB, RAB	Number of extension groups engaging in the group marketing of horticultural produce. (MINALOC report).	The Twigire extension system will be successfully established and fully financed.

1.4.2 Improve rural access roads, main roads between towns and points of cross-border trade, and fresh produce market structures and facilities.	MINALOC, MININFRA, MINICOM	Increases in the mileage of such roads. Number of markets significantly upgraded (Joint MINALOC/MININFRA/MINICOM reports).	Such multi-purpose infrastructure is accorded priority by the government.
1.4.3 Continue the eSoko market price information system to help improve efficiency in the domestic market.	MINAGRI	Financing secured and system continued. (MINAGRI report).	-
1.4.4 Reduce post-harvest losses through the training of farmers and traders in conservation and on-farm storage techniques.	MINALOC, NAEB, RAB	Losses reduced. (NAEB analyses).	The Twigire extension system will be successfully established and fully financed.
1.4.5 Reduce post-harvest losses by providing covered, well-ventilated areas at rural markets and chilled overnight storage at fresh produce wholesale markets in Kigali.	MINALOC, MININFRA, MINICOM	Number of markets significantly upgraded. (Joint MINALOC/MININFRA/MINICOM report).	-
1.4.6 Take other measures to reduce post-harvest losses.	NAEB, RAB, MINICOM		NAEB HPU established and staffed.
1.4.7 Establish a new fresh produce wholesale market in Kigali.	MINALOC, MININFRA, MINICOM	Market established and utilised at high capacity. (MININFRA report).	Wholesalers are prepared to move to this market.
OUTPUT 1.5: Reduced local and national seasonal gluts.			
1.5.1 Import or breed and then adopt early and late-maturing varieties.	MINAGRI, MINALOC	New early and late maturing varieties adopted by farmers. (MINAGRI/MINALOC report).	The procedure for releasing new varieties is simplified.
1.5.2 Increase the efficiency of domestic marketing to end users in Rwanda and to neighbouring countries through actions 1.4.1 to 1.4.7.			
OUTPUT 1.6: More efficient value chains through the expansion of contract farming involving farmer organisations.			
1.6.1 Encourage the formation of farmer associations and cooperatives whose main function is to market members' horticultural produce under contract farming arrangements with downstream traders and processors.	NAEB, RCA	Number and membership of new farmer marketing associations and cooperatives (Joint NAEB/RCA) report.	There is sufficient local output available for marketing to make such organisations viable.
1.6.2 Support strengthening of the capacity to manage such	NAEB, RCA	Number and membership of farmer	-

organisations.			marketing associations and cooperatives strengthened (Joint NAEB/RCA report).	
1.6.3 Develop model contracts suitable for horticultural produce.	NAEB, RCA		Samples of these contracts for each of the main crops. (NAEB/RCA).	-
1.6.4 Train organisation staff and traders/processors in the negotiation and enforcement of contracts.	NAEB, RCA, MINICOM		Number of staff trained. (Joint NAEB/RCA/MINICOM report).	-
1.6.5 Subsidise para-legal assistance for the negotiation and drafting of contracts.	NAEB, RCA, MINICOM		Number of contracts subsidised. Total cost of assistance. (Joint NAEB/RCA report).	-
1.6.6 Assist traders and processors to establish nucleus estates through facilitating land consolidation for this purpose.	NAEB		Number and areas of nucleus estates established. (NAEB report)	Farms households agree voluntarily to such consolidation.
OUTPUT 1.7: An increase in the value which is added domestically to horticultural crops after they leave the farm.				
1.7.1 Form a PPP with a foreign manufacturing company to establish a domestic plant to manufacture packaging for air-freighted horticultural produce and domestically processed fruit juices and other horticultural products.	MINICOM		PPP formed. Plant running at high capacity. (MINECOM reports).	A foreign manufacturer can be attracted to invest in this venture without the need to grant excessive incentives.
1.7.2 Lift the ban on the use of polythene in the packaging of horticultural produce and replace it with strict recycling provisions.	MINICOM		Legislation modified. (MINECOM note).	Enforcement of recycling is feasible.
1.7.3 Simplify the approval procedures for Business Develop Fund and donor loans to small-scale processors of horticultural produce.	MINAGRI		Procedure simplified. (MINAGRI report).	Possible to be done for the horticulture sector only or done as part of a simplification for all agro processors or all SMEs nationwide.
1.7.4 Train staff of micro-lending organisations in the evaluation of business plans of potential loanees.	MINECOFIN		Number of staff trained. (MINECOFIN report).	-
1.7.5 Reduce the Rwanda Bureau of Standards (RBS) charges to SMEs for certifying horticultural products and issuing RBS standardization marks and RBS marks of excellence.	MINAGRI		Charges reduced. (RBS note).	Possible to be done for the horticulture sector only or done as part of a reduction for all agro processors or all SMEs nationwide.

<p>OUTCOME 2: Progressive increase in the ability of poor households to acquire fruits and vegetables and progressive improvement in the efficiency of fruit and vegetable use in poor households.</p>			
<p>OUTPUT 2.1: Increased capacity of small-scale households to acquire vegetables and fruits.</p>			
<p>2.1.1 Increase the horticultural output of small-scale farms through the actions to achieve Objective 1.</p>			
<p>2.1.2 Establish and provide support to household vegetable garden farmer field schools that comprise members of households most vulnerable to food insecurity.</p>	<p>MINAGRI, MINALOC</p>	<p>Number of (i) such farmer field schools and (ii) the number of farmers attending such schools analysed by schools (a) newly established and (b) receiving ongoing support. (Joint MINAGRI/MINALOC report).</p>	<p>-</p>
<p>2.1.3 Train children and youths in vegetable production and use by establishing new, and improving existing, vegetable gardens at pre-primary, primary, secondary and vocational training schools.</p>	<p>MINEDUC</p>	<p>Number of, and number of students trained in such (a) established and (b) new gardens. (Joint MINAGRI/MINALOC report).</p>	<p>-</p>
<p>2.1.4 Establish village nurseries for fruit trees.</p>	<p>MINALOC</p>	<p>Number of nurseries established and number of fruit trees planted. (MINALOC report).</p>	<p>-</p>
<p>OUTPUT 2.2: Increased capacity of small-scale households to utilise fruits and vegetables efficiently.</p>			
<p>2.2.1 Provide technical assistance in food preparation tailored to meeting the needs of the most vulnerable households.</p>	<p>MINAGRI, MOH, MINALOC</p>	<p>Estimate of the number of households benefitting from this TA. (MINAGRI report).</p>	<p>-</p>

OUTCOME 3: Rapid growth in net national export earnings from trade in fresh and processed horticultural produce.				
OUTPUT 3.1: Identification of a small set of horticultural crops to be grown for export to international markets on a pilot basis.				
3.1.1 Prepare a report containing analytical notes on a 'long list' of potential horticultural export crops (including cut flowers, crops for the extraction of essential oils, and macadamia nuts) suited to Rwandan growing conditions, covering production, processing, marketing and markets.	NAEB HPU	Report on potential horticulture export crops completed. (NAEB report available).	NAEB HPU established and staffed.	
3.1.2 Hold stakeholder workshop at which the long-list is reduced to an agreed short list.	NAEB	Workshop held. Short list established. (NAEB minutes).	High stakeholder attendance at the workshop.	
3.1.3 Carry out international market assessments for each short-listed crop.	NAEB	Assessment reports completed. (NAEB reports available).	-	
3.1.4 Use the findings of the international market assessments to reduce the short list to a set of crops to be piloted.	NAEB	Report documenting the final selection process and its outcome. (NAEB report available).	NAEB HPU established and staffed.	
OUTPUT 3.2: Optimal growing areas identified for the crops to be piloted.				
3.2.1 Undertake an analysis that combines physical and socio-economic conditions to identify one or more areas suitable for the piloting of each crop.	RAB, NAEB	Report on optimal growing areas completed. (Joint RAB/NAEB report).	RAB's capacity to undertake horticulture research expanded. NAEB HPU established and staffed.	
OUTPUT 3.3: An environment to encourage enterprises to lead and participate in developing value chains for the production, assembly, preparation/processing, and international export of horticultural produce.				
3.3.1 Develop a supportive environment for contract farming through the activities specified to meet Output 1.6.				
3.3.2 Undertake and make available the findings of a study of the impact of the rail line being constructed from Kigali to Mombasa on the unit costs of exporting less perishable Rwandan horticultural produce by rail and sea.	NAEB	Study report completed. (NAEB report available).	Timely completion of all sections of this rail link.	
3.3.3 Establish a set of financial incentives for each of the pilot lead enterprises aimed at offsetting the risk of being involved in such	NAEB, MINICOM	Legislation providing for the incentives. (MINECOFIN report).	-	

pilot activities.	MINECOFIN			
3.3.4 Encourage an international certifying agency to establish an office in Rwanda.	NAEB	Office established. (NAEB report).	An international certifying agency can be attracted to Rwanda without the need to grant it excessive incentives.	
3.3.5 Organise the consolidation of farmers' land in the suitable growing areas identified for each crop to be piloted.	MINALOC	Hectares consolidated for each piloted crop. (MINECOFIN report).	Farmers agree to such consolidation.	
3.3.6 Establish a vegetable and fruit packhouse with cooling facilities that will be privatised once it has been demonstrated that it can be operated at a profit.	NAEB	Packhouse established and functioning at high capacity. Packhouse privatised. (NAEB reports).	Packhouse is designed to provide for the packing of a range of crops and, once established, can be operated as a commercial venture.	
3.3.7 Establish a flower park as a public-private enterprise for the protected and open-field growing of roses for export, with the aim of eventual full privatisation.	NAEB	Areas planted to roses in greenhouses and in open fields. (NAEB report).	A suitably experienced private enterprise is prepared to participate.	
3.3.8 Prepare other potential sites suitable for the growing of flowers, equip them with basic infrastructure, prepare feasibility studies for flower growing at the sites, and make these studies available to potential investors.	NAEB	Number of sites prepared, number of feasibility studies prepared, number of sites at which production is established. (NAEB report).	Land available, feasibility studies show that investment can be potentially profitable.	
3.3.9 Taking account of lessons learned, replicate Action 3.4.8 for other crops selected for piloting and for which private enterprises are only prepared to invest either in partnership with government or after the government has prepared a suitable site and undertaken a feasibility study.	NAEB	Number of sites prepared, number of feasibility studies prepared, number of sites on which production is established (NAEB report).	Land available, feasibility studies show that investment can be potentially profitable.	
OUTPUT 3.4: Competitive selection of lead enterprises to be involved in piloting.				
3.4.1 Prepare tender documents for the competitive selection of lead enterprises and advertise the tender within Rwanda and internationally.	NAEB, Rwanda Public Procurement Authority (RPPA)	Documents prepared. (RPPA note).	-	
3.4.2 Undertake a technical evaluation of the business plan and other submissions in each tender offer, and prepare tender briefing papers.	NAEB HPU	Briefing papers prepared. (NAEB).	NAEB HPU established and staffed.	

3.4.3 Select enterprises and issue approval letters.	MINAGRI, RPPA	Approval letters issued. (RPPA).	At least one acceptable tender offer made for each crop.
3.4.4 Form a Horticulture International Export Working Group (HIEWG).	NAEB	HIEWG meeting minutes (NAEB).	Meetings are attended by senior staff of the member entities.
OUTPUT 3.5: Monitoring and evaluation of the pilots			
3.5.1 Review semi-annual reports of each lead enterprise and prepare a semi-annual summary evaluating progress on the development of Rwanda's production and export of horticultural commodities and products to international markets.	NAEB HPU	Semi-annual summaries. (Receipt by the Director General of NAEB).	NAEB HPU established and staffed.
OUTPUT 3.6: Enlarge and replicate successful pilot value chains			
3.6.1 Establish a revised set of financial incentives that reflect the reduced risk of replicating successful pilots.	NAEB, MINICOM MINECOFIN	Legislation providing for the revised incentives. (MINECOFIN note).	-
3.6.2 Repeat the actions to achieve Outputs 3.2 , 3.3 3.4 and 3.5, selected and modified to reflect lessons learned during the piloting phase.			
OUTCOME 4: Increase the national capacity to undertake improved horticulture-sector policy analysis and planning.			
OUTPUT 4.1: Improved data on domestic horticulture.			
4.1.1 Analyse cross border horticulture trade data by crop, seasonal patterns, country of origin/destination, and border crossing point.	NAEB HPU	Report on the cross-border horticulture trade completed. (NAEB report available).	NAEB HPU established and staffed.
4.1.2 Improve the consistency of MINAGRI and NISR estimates of the national area and production of horticulture crops and publish harmonised metadata for these estimates.	MINAGRI, NISR	Harmonised metadata. (Publication by NISR).	A high level of cooperation and ongoing coordination between MINAGRI and NISR.
4.1.3 Make approximate estimates of national post-harvest losses for each of Rwanda's main vegetables and fruits and assess the main causes of losses.	NAEB HPU	Estimates and assessments completed. (NAEB report).	NAEB HPU established and staffed.
4.1.4 Collect data on market throughput of horticultural produce as a part of eSoko's twice-weekly market surveys and employ this data to analyse the movement of horticultural produce in the domestic market.	eSoko, NAEB HPU	Data collected regularly and utilised in analysing the movement of produce domestically. (NAEB reports).	This does not hamper the rapid dissemination of eSoko information on market prices.

OUTPUT 4.2: A functioning Horticulture Policy Unit (HPU) within NAEB's Horticulture Division			
4.2.1 Revise the structure of NAEB's Horticulture Division to accommodate an HPU.	NAEB	Revised structure agreed. (NAEB note).	-
4.2.2 Design the HPU, including functions, staff positions and job descriptions.	NAEB	Design agreed. (NAEB note).	-
4.2.3 Staff the HPU and recruit a medium-term adviser to work within the unit to help initiate its activities and provide on-the-job training.	NAEB	Unit staffed and adviser in place. (NAEB note).	-

*Note that some *activities* will contribute to achieving more than one *output* under the same *outcome* and/or under more than one *outcome*. Similarly some *outputs* will contribute to achieving more than one *outcome*. In such instances the activities and outputs are placed in the logframe under, respectively, the output and objective with which they have the most direct link and/or where their contribution to the output or outcome would seem likely to have the greatest impact in achieving the goal.

** An additional necessary condition for effective implementation of each activity is that adequate financing is budgeted for and delivered.

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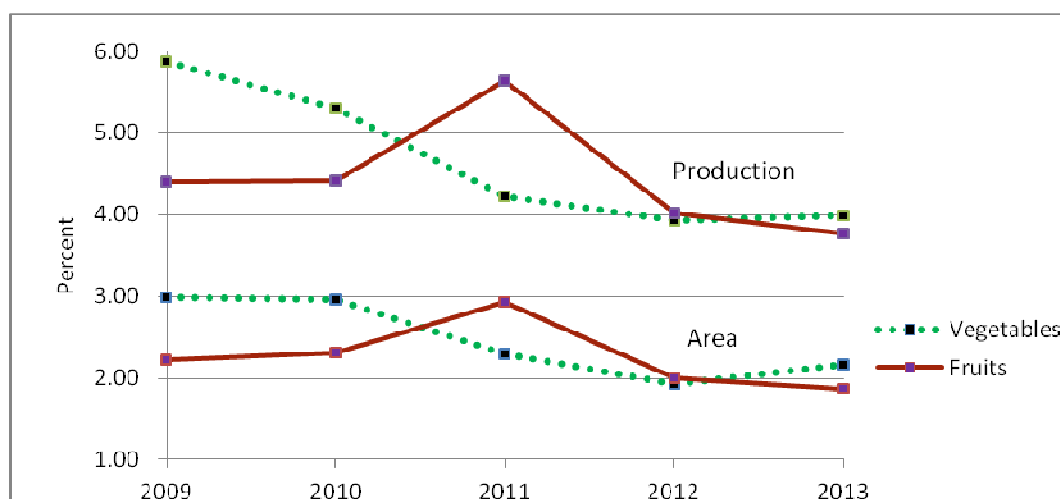
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Statistics Annex Table 1: National Area, Production and Yield of Vegetables, Fruits and All Crops

	2009	2010	2011	2012	2013
Area (ha)					
Vegetables	51,883	51,767	21,464	35,941	42,038
Fruits	38,601	40,431	27,439	37,228	36,272
Total vegetables and fruit	90,484	92,198	48,903	73,169	78,310
All crops	1,734,403	1,747,560	935,176	1,866,106	1,943,731
Production (mt)					
Vegetables	542,891	541,900	246,577	460,816	484,829
Fruits	407,237	451,900	329,391	472,278	458,874
Total vegetables and fruit	950,128	993,800	575,968	933,094	943,703
All crops	9,254,747	10,224,422	5,845,175	11,746,286	12,172,254
Yield (mt/ha)					
Vegetables	10.46	10.47	11.49	12.82	11.53
Fruits	10.55	11.18	12.00	12.69	12.65
Total vegetables and fruit	10.50	10.78	11.78	12.75	12.05
All crops	5.34	5.85	6.25	6.29	6.26

National Area and Production of Vegetables and Fruits as a Percentage of those of all Crops, 2009-2013



Source: MINAGRI Annual Crop Estimates. The data shown are the sum of estimates for seasons A and B. Note that 'Fruits' includes fruit bananas.

Statistics Annex Table 2: 2012/13 National Seasonal and Total Area, Production and Yield of Vegetables Fruits and all Crops Analysed by Province

Area (ha)	Season A					Season B					Season C					Annual Total		
	Kigali City	Southern	Western	Northern	Eastern	Total	Kigali City	Southern	Western	Northern	Eastern	Total	Kigali City	Southern	Western	Northern	Eastern	Total
Vegetables	944	2,813	3,287	2,441	3,089	12,574	728	3,056	3,499	2,722	2,370	12,375	1,672	6,220	7,484	5,480	5,840	26,696
Fruit banana	1,505	10,867	3,114	5,376	5,456	26,318	1,155	10,088	3,821	4,404	7,754	27,222	2,660	20,955	6,935	9,780	13,210	53,540
Other fruits	121	986	1,369	1,494	1,412	5,382	82	1,212	1,207	1,745	1,344	5,590	203	2,199	2,576	3,239	2,756	10,973
All fruits	1,626	11,853	4,483	6,870	6,868	31,700	1,237	11,300	5,028	6,149	9,098	32,812	2,863	23,154	9,511	13,019	15,966	64,513
All fruits and vegetable	2,570	14,666	7,770	9,311	9,957	44,274	1,965	14,356	8,527	8,871	11,468	45,187	352	698	16,995	18,499	21,806	91,209
Total land cropped	21,116	191,402	162,375	133,006	169,391	677,290	24,578	229,811	133,392	148,233	217,449	753,463	351	698	317	381	453	1,432,500
Production (mt)																		
Vegetables	9036	11553	2493	30959	29280	105321	5384	19360	20117	25606	23085	93552	5546	11451	2169	7274	26440	225313
Fruit banana	13922	47348	17301	20063	34008	132642	7911	57476	33050	22816	82035	203288	0	0	0	0	0	335930
Other fruits	116	6416	7593	13263	2133	29521	-	7327	7503	15360	6090	36280	0	0	0	0	0	65801
All fruits	14038	53764	24894	33326	36141	162163	7911	64803	40553	38176	88125	239568	0	0	0	0	0	401731
All fruits and vegetable	23074	65317	49387	64285	65421	267484	13295	84163	60670	63782	111210	333120	5546	11451	2169	7274	26440	627044
All crops	81750	725395	700374	619845	1215110	3342474	84313	1002620	955280	687190	1416326	4145729	11438	54388	29483	7829	103138	7591341
Yield (mt/ha)																		
Vegetables	9.6	4.1	7.5	12.7	9.5	8.4	7.4	6.3	5.7	9.4	9.7	7.6	15.8	16.4	6.8	19.1	15.1	8.4
Fruit banana	9.3	4.4	5.6	3.7	6.2	5.0	6.8	5.7	8.6	5.2	10.6	7.5	-	-	-	-	-	6.3
Other fruits	1.0	6.5	5.5	8.9	1.5	5.5	5.1	6.0	6.2	8.8	4.5	6.5	-	-	-	-	-	6.0
All fruits	8.6	4.5	5.6	4.9	5.3	5.1	6.4	5.7	8.1	6.2	9.7	7.3	-	-	-	-	-	6.2
All fruits and vegetable	9.0	4.5	6.4	6.9	6.6	6.0	6.8	5.9	7.1	7.2	9.7	7.4	-	-	-	-	-	6.9
All crops	3.9	3.8	4.3	4.7	7.2	4.9	3.4	4.4	7.2	4.6	6.5	5.5	32.6	77.9	93.0	20.5	59.0	5.3

Source: Derived from data in NISR (2013), Seasonal Annual Survey Report.

Statistics Annex Table 3: 2012/13 National Fruit and Vegetable Production as a Percentage of all Crop Production Analysed by Province

Area (ha)	Season A					Season B					Season C					Annual Total		
	Kigali City	Southern	Western	Northern	Eastern	Total	Kigali City	Southern	Western	Northern	Eastern	Total	Kigali City	Southern	Western	Northern	Eastern	Total
Vegetables	4.5	1.5	2.0	1.8	1.8	1.9	3.0	1.3	2.6	1.8	1.1	1.6	3.7	1.5	2.5	1.9	1.5	1.9
Fruit banana	7.1	5.7	1.9	4.0	3.2	3.9	4.7	4.4	2.9	3.0	3.6	3.6	5.8	5.0	2.3	3.5	3.4	3.7
Other fruits	0.6	0.5	0.8	1.1	0.8	0.8	0.3	0.5	0.9	1.2	0.6	0.7	0.4	0.5	0.9	1.2	0.7	0.8
All fruits	7.7	6.2	2.8	5.2	4.1	4.7	5.0	4.9	3.8	4.1	4.2	4.4	6.3	5.5	3.2	4.6	4.1	4.5
All fruits and vegetable	12.2	7.7	4.8	7.0	5.9	6.5	8.0	6.2	6.4	6.0	5.3	6.0	9.9	7.0	5.7	6.6	5.6	6.4
Total land cropped	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Production (mt)																		
Vegetables	11.1	1.6	3.5	5.0	2.4	3.2	6.4	1.9	2.1	3.7	1.6	2.3	8.7	2.1	3.3	4.4	2.3	3.0
Fruit banana	17.0	6.5	2.5	3.2	2.8	4.0	9.4	5.7	3.5	3.3	5.8	4.9	13.1	6.0	2.9	3.2	4.4	4.4
Other fruits	0.1	0.9	1.1	2.1	0.2	0.9	0.7	0.8	2.2	0.4	0.9	0.7	0.1	0.8	0.9	2.1	0.3	0.9
All fruits	17.2	7.4	3.6	5.4	3.0	4.9	9.4	6.5	4.2	5.6	6.2	5.8	13.2	6.8	3.8	5.3	4.7	5.3
All fruits and vegetable	28.2	9.0	7.1	10.4	5.4	8.0	15.8	8.4	6.4	9.3	7.9	8.0	48.5	21.1	7.4	92.9	25.6	33.0
All crops	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Yield (mt/ha)																		
Vegetables	247.2	108.4	172.8	272.1	132.1	169.7	215.6	145.2	80.3	202.9	149.5	137.4	48.5	21.1	7.4	92.9	25.6	159.3
Fruit banana	238.9	115.0	128.8	80.1	86.9	102.1	199.7	130.6	120.8	111.8	162.4	135.7	250.4	250.4	250.4	250.4	250.4	118.4
Other fruits	24.8	171.7	128.6	190.5	21.1	111.1	111.1	138.6	86.8	189.9	69.6	118.0	250.4	250.4	250.4	250.4	250.4	113.2
All fruits	223.0	119.7	128.7	104.1	73.4	103.7	186.4	131.4	112.6	133.9	148.7	132.7	250.4	250.4	250.4	250.4	250.4	117.5
All fruits and vegetable	231.9	117.5	147.4	148.1	141.6	122.4	197.2	134.4	99.4	155.1	148.9	134.0	250.4	250.4	250.4	250.4	250.4	129.7
All crops	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Statistical Annex Table 2, above.

**Statistics Annex Table 4: MINAGRI and NISR National Production Data
for Vegetables, Fruits and All Crops**

(MT)

	NISR SURVEY DATA			MINAGRI SURVEY DATA
	National Agricultural Survey 2008*	Seasonal Agricultural Survey 2013	Percentage change 2008-2013	2013 Crop estimates
Vegetables*	256,476	225,313	-12.15	646,439
<i>Fruit banana</i>	91,191	335,930	268.38	-
<i>Other fruits</i>	124,038	65,801	-46.95	-
All Fruits incl. fruit banana	215,229	401,731	86.65	504,761
Total horticulture	686,934	627,044	-8.72	1,151,200
All crops	3,863,288	7,541,321	95.20	12,172,254

* The vegetable data do not include fresh beans or fresh green maize.