



Kingdom of the Netherlands



TRAIDE

Investment Opportunities in the Rwandan Herbs and Spices Sector

TRAIDE Rwanda



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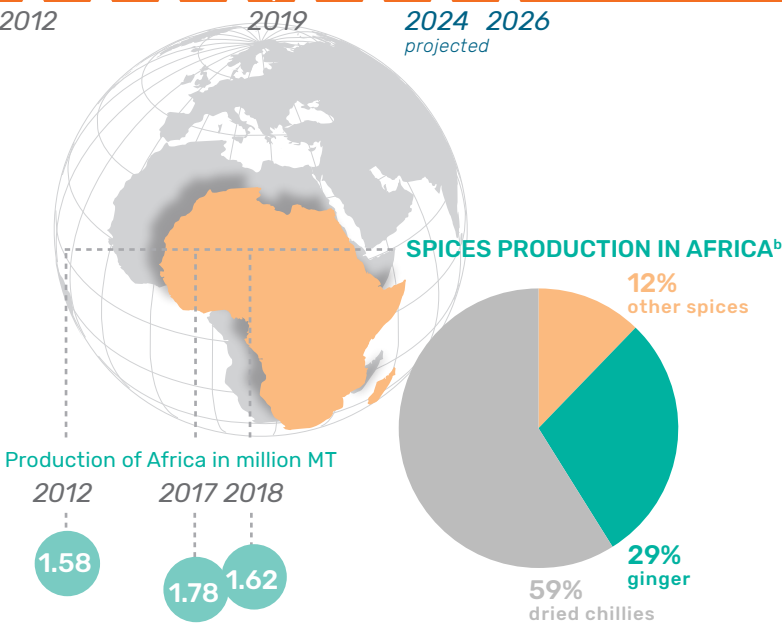
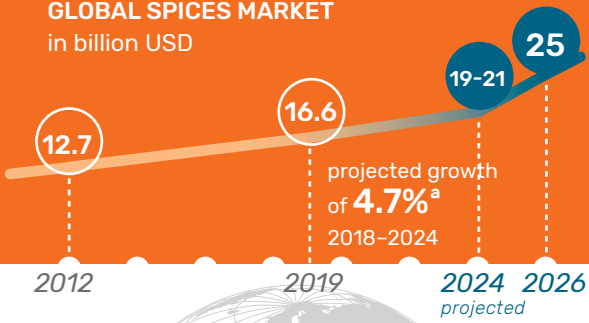
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Fact sheet Rwandan Herbs and Spices sector

GLOBAL SPICES MARKET in billion USD



LABOUR COSTS⁹



Casual labour

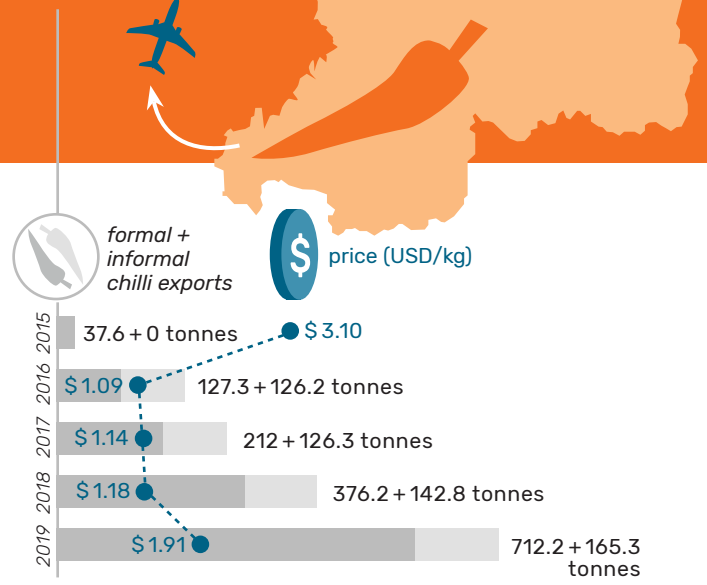
1.5-2.0 USD/day



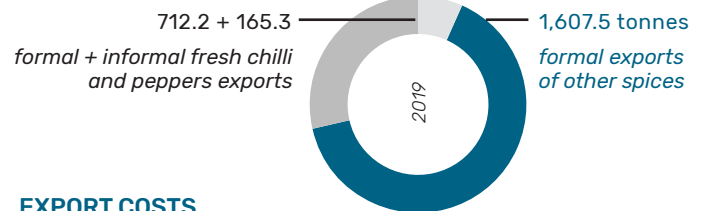
Specialist staff

net 150-450 USD/month

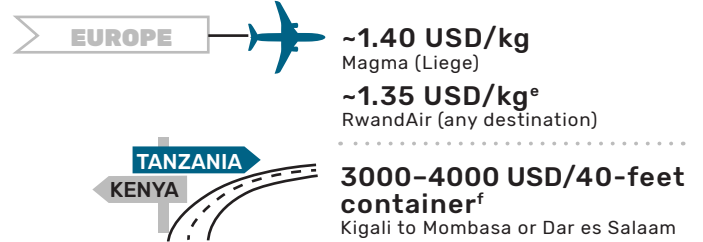
Annual chilli exports Rwanda^c (tonnes)



EXPORT PRODUCTION RWANDA^d



EXPORT COSTS



INVESTMENT OPPORTUNITIES: SPICES AND HERBS

Please review chapter 7 regarding market opportunities for more detailed information.

	Compatibility Rwandan climate	Labour intensity - cultivation	Suitability outgrower schemes	Market potential
Chilli	Medium	High	High	High
Black pepper	Medium	High	Medium	Medium
Cardamom	High	High	Medium	Medium
Ginger	High	Medium	Medium	High
Paprika (sweet)	High	Medium	Low	High
Vanilla	Medium	High	Low	High
Rosemary	Medium	Low	Medium	Medium

^a Mordor Intelligence, 2019.

^b FAOstat, 2019.

^c Export data provided by NAEB in 2020.

^d Export data provided by NAEB in 2020.

^e Estimated prices by RDB and NAEB for 2019-2020 in 'Horticulture: The Rwanda Opportunity'.

^f Estimated prices by RDB and NAEB for 2019.

⁹ NAEB, 2019.

Executive summary

This report explores investment opportunities in Rwanda for Dutch businesses operating in the spices and herbs sector. Rwanda seeks to develop equitable relationships with other countries, moving from aid to trade. Sustainable and inclusive growth of the spices and herbs sector can contribute to this process. Firstly, characteristics of the country in terms of geography, climate, infrastructure, enabling environment and stakeholders are described. Subsequently, these characteristics are used to identify possible investment opportunities as well as challenges for foreign and local businesses.

The global spices and seasonings market are expected to grow with approximately five percent between 2018 and 2024. This growth rate is triggered mainly by a growing world population, a rising middle class and changing diets, which require more seasoning.¹ Steady growth of European demand is expected on the long term and hence, companies are looking for long-term partners to provide constant supplies of spices, ideally combined with transparent tracing.

Spice production is highly volatile due to environmental factors, such as rainfall, floods and draughts, resulting in frequent discrepancies in demand and supply. On the global market, production has shifted from China and India to other Asian countries, South America and Africa. In the past years, Ethiopia has managed to become Africa's main exporter of spices followed by Nigeria. The Ethiopian climate and soil composition are beneficial for spice cultivation. Moreover, land and water resources are plentiful.

Similarly, Rwanda has the potential to grow into a spice exporter thanks to its beneficial climate conditions. Rwanda is a major exporter of tea and coffee. The successful cultivation of these crops indicates the potentially lucrative cultivation of spices. At this point, spices production in Rwanda is still in its infancy. Cultivation expertise, processing capacity and financial resources are still limited. However, chilli production for export is rapidly expanding and more recently, ginger production for export has also started. Furthermore, the Rwandan government has developed several large-scale irrigation projects for export producers. Additionally, the country has a favourable business climate and offers investors incentive packages such as duty-free imports of necessary equipment, machinery, raw materials and spare parts.



1. Markets and trends

The global seasonings and spices^h market is expected to grow five percent between 2018 and 2024.² The major trends fuelling growth are global population growth and the growing Chinese and Indian middle class. Furthermore, shifting dietary preferences, mostly in Europe and the US, push demand for meat substitutes part of vegetarian/vegan diets, ‘superfoods’ⁱ consumed for their proclaimed health benefits, convenience foods and ethnic food.

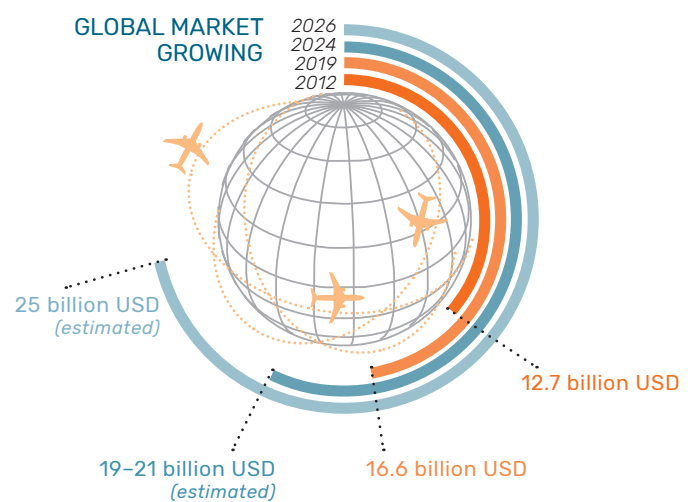
Spices and herbs are not only used for seasoning of foods. There are many other applications, which are also driving demand. Spices are used as ingredients for make-up, (homeopathic) medication and colour extraction. Also, the extraction of essential oils from herbs such as lemon grass and rosemary has become increasingly popular.

It is difficult to meet growing market demand for herbs and spices due to highly volatile production susceptible to environmental factors, such as rainfall, floods and draughts, resulting in frequent discrepancies in demand and supply. Moreover, traditional spice and herb producing countries see local consumption rising, which results in lesser exports. For example, the growing domestic demand for spices in China and India leads to less exports to the EU from these countries.

These factors are pushing European importers to build partnerships with new suppliers in new countries. Spice producers and buyers are investigating opportunities for production and sourcing of spices in Africa to fill the gap. Many African countries seem suitable for spice production in terms of soil composition and climatological circumstances. The challenge is to find partners who can comply with EU requirements for food quality and safety.

^h This figure includes salt and salt substitutes.

ⁱ The Nutrition Source (2020): “There is no scientifically based or regulated definition for superfood, but generally, a food is promoted to superfood status when it offers high levels of desirable nutrients, is linked to the prevention of a disease, or is believed to offer several simultaneous health benefits beyond its nutritional value.” Retrieved from <https://www.hsph.harvard.edu/nutritionsource/about/>



MARKETS

The global market for seasoning and spices has been growing steadily over the past years. In the period 2012–2019, this market grew from a global value of 12.7 billion USD in 2012 to a market value of 16.6 billion USD by the end of 2019. In 2024, the value of the global seasoning and spices market is expected to range between 19 billion USD and 21 billion USD. Recent research estimates a global market value of 25 billion USD by the end of 2026.³

The world’s most traded spices are black pepper, vanilla and ginger. Black pepper is majorly produced in Vietnam, India and China and imported by the United States and Germany. Vanilla is grown in Madagascar, Indonesia and Mauritius, with Madagascar exporting vanilla for 573 million USD in 2019, more than half of the world’s export value (1,097 million USD). Finally, ginger’s main exporters are China, Thailand and India. China is the lead exporter of ginger, both fresh and dried (total of 537,796 tonnes), followed by Thailand for fresh ginger (77,797 tonnes) and India for grinded ginger (3,981 tonnes).⁴

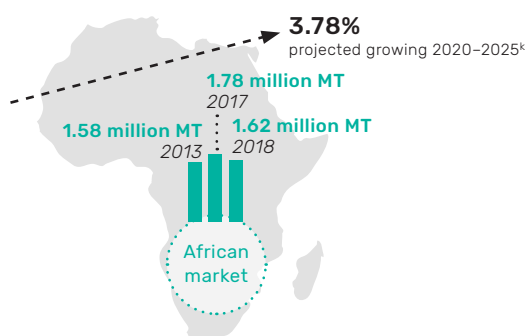
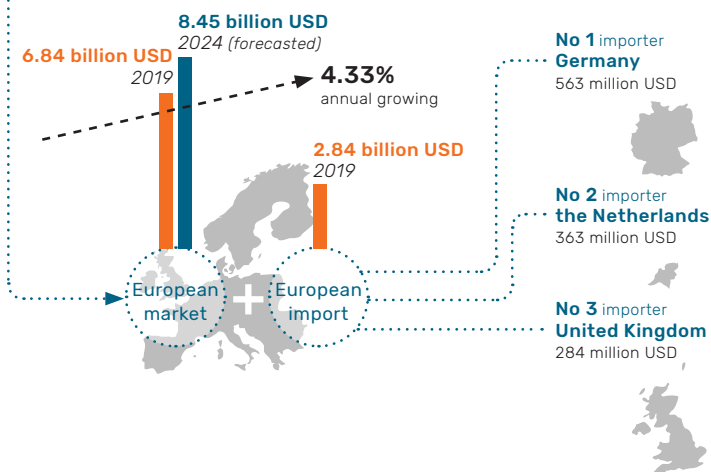
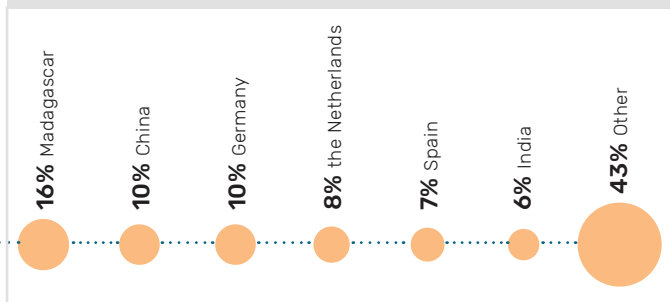
Europe

The European spices market had a total estimated value of 6.84 billion USD by the end of 2019 and is forecasted to reach 8.45 billion USD in 2024, growing at an annual rate of 4.33 percent.⁵

Europe has witnessed fast growth in the spice and herbs market. This growth can partly be explained by distribution (import-export) hubs in countries such as the Netherlands, Germany and Spain, but also by increased consumption. Europe will continue to function as the most important distribution hub of spices, but other regions are expected to show higher growth rates due to rapid economic development.

In 2019, European countries imported spices^j for a value of 2.84 billion USD. The main importers were Germany (563 million USD), the Netherlands (363 million USD) and the United Kingdom (284 million USD).⁶

Figure 1. ORIGIN OF SPICES ON THE EUROPEAN MARKET
(SOURCE: CBI, 2018.)



“The EU market for spices and herbs is expected to grow by seven percent in the next five years.”⁷

Interest in new spices and connected exotic cuisines varies between eastern and western Europe. Mexican, Indian, Chinese, Japanese and south-east Asian cuisines are firmly established in western Europe and accompanying spices are no longer considered new or trendy. By contrast, the popularity of these cuisines and spices is still growing in eastern European countries.

Meanwhile, western European consumers are looking for new inspiration in African and Middle Eastern cuisines. Popular spices and spice blends from Africa and the Middle East include *baharat*, *berbere*, *ras el hanout*, *sumac*, *zaatar*, *harissa*, *saffron*, *dukkah* and Aleppo pepper, many of which have been recently introduced to European markets by leading European spice companies. Dutch spice company Euroma introduced several African spice mixtures to its original spices line, including African barbecue or African *braai*, *baharat*, *ras el hanout* and *zaatar*.⁸

Africa

In Africa, spices and herbs are produced and consumed across the whole continent. Several countries have specialized in spices production and export them internationally. In 2019 Madagascar exported mostly vanilla and cloves, Malawi exported chilli and Nigeria exported ginger. Other African countries, such as Ethiopia, export herbs, black pepper, paprika, coriander, cumin, cinnamon and turmeric.⁹

The most important spices produced in Africa are dried chillies, which represent 57 percent of total produced volume. The production of dried chillies has increased substantially over the years with an average annual growth rate of 3.4 percent between 2013 and 2018. The second largest crop in terms of production volume is ginger accounting for 29 percent. However, the production of ginger is decreased with a negative average annual growth rate of -4.2 percent between 2013 and 2018.¹⁰ This decrease can be explained by the fact that ginger production came (close) to complete halt in Ethiopia, one of Africa’s main ginger producers.

The demand size is growing at a fast pace and consumers are becoming aware of the benefits of using spices and seasonings. Key drivers behind this growth are an expanding middle class, the upcoming tourism sector, as well as increased awareness of consumers of the benefits of using spices and seasoning. In addition, the increased consumption of meat in developing countries has an increasing effect on spices consumption.

Africa’s seasoning and spices market is projected to grow with 3.78% between 2020 and 2025. In the period 2013–2018, the spice production in Africa has increased from 1.58 million MT in 2013 to 1.62 million MT in 2018 (and attained a peak of 1.78 million MT in 2017).

^j Pepper of the genus piper; dried or crushed or ground fruits of the genus capsicum or of the genus pimenta; vanilla; cinnamon and cinnamon-tree flowers; cinnamon and cinnamon-tree flowers; ginger, saffron, turmeric (curcuma), thyme, bay leaves, curry and other spices.

^k FAOstats, 2019.

TRENDS

Changing diets

Around the world, consumers are changing their diets with a more prominent role for spices and herbs. The major trends seem to be an increasing demand for exotic, healthy and convenience foods. These trends have increased the demand for various spices, especially in Europe and North America, thereby boosting the growth of the global spices market.¹¹

Ethnic food

The growth of the spices market can be partially attributed to the growing popularity of ethnic cuisines. Migration has increased culinary diversity resulting in the rising popularity of ethnic food around the world. Moreover, international travel for tourism and business has familiarized people with a wide variety of foods. Consumers have become more interested in other cultures, resulting in more and more product launches that advertise and connect flavour, name of the country, brand and product (for example, “Za’atar Authentic Lebanese Herb Blend”).¹²

Healthier lifestyle

Consumers are adopting a healthier lifestyle. The health benefits of spices and herbs are widely recognized, some spices and herbs have been promoted as so-called ‘superfoods’ on the basis of high concentrations of micronutrients and antioxidants as well as anti-inflammatory properties.¹³ This is one of the reasons why spices such as turmeric, cinnamon, pepper, ginger and rosemary have experienced a boost in their popularity.¹⁴

Convenience foods

Furthermore, consumers are working longer hours, which results in less time for cooking. This trend is pushing demand for on-the-go convenience foods (incorporating spices into ready-to-eat and ready-to-drink foods and beverages).¹⁵ Blended spices have witnessed demand from various strata of the population, as they are convenient across various applications, such as savoury snacks and ready meals, amongst others.

Organic production

The organic spices market is estimated to represent between five and seven percent of the total market.¹⁶ The organic spices market size has a projected Compound Annual Growth Rate (CAGR) of 5.1 percent between 2019 and 2026.¹⁷ (272.8 million USD in 2018 and 406.6 million USD by 2026.)

Surging demand for organic spices and herbs is expected to offer lucrative opportunities in the coming years. The Centre for the Promotion of Imports from developing countries (CBI) forecasts that the market for organic spices and herbs will grow exponentially in the next ten years. However, price volatility and minimal willingness of consumers to pay a premium might hinder growth.¹⁸

Only two percent of Africa’s farmland is considered organic according to data from the Research Institute of Organic Agriculture (FiBL). This percentage is seven times smaller than the global average. Local NGOs and farmers’ groups, as well as development agencies are increasingly adopting organic techniques as a method of improving productivity and addressing the very pressing problems of food security faced by all too many Africans.¹⁹

There are two types of organic farming in Africa, certified organic production and non-certified. The former is mostly geared towards export to Europe and the US. Obtaining certification is usually too expensive for independent farmers or small cooperatives due to high costs and time-consuming procedures.²⁰ Therefore, organic certification is mainly organized through participatory guarantee systems. An Internal Control System is implemented by a farmers group linked to an exporter, where the exporter holds the organic certificate.

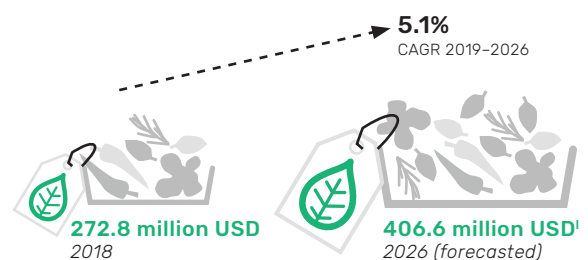
Sustainable and traceable sourcing

Consumer awareness about sustainability of food is on the rise in Europe and the US. Consumers want reassurance that products they buy have been produced under proper social and environmental conditions. Consequently, demand for traceable and sustainable spices is on the rise. Growers and/or exporters can provide reassurance through certification schemes such as Organic, Rainforest Alliance and Fairtrade.

Recently, the sustainability trend moved from niche markets into the mainstream. Now, the mainstream market leaders are investing in sustainability not only because of a better social image, but also because they recognize benefits such as costs reduction, shorter supply chains and easier compliance with European regulations. Important sustainability issues in the spice sector are related to pesticide residues and inadequate drying methods leading to, among other things, aflatoxin problems. Also, there are risks related to labour standards, such as the position of women, migrants and children.

In order to improve sustainable production and sourcing of spices, a group of mainly European companies and organizations founded the Sustainable Spices initiative in 2012. Their main objective is to strive towards fully sustainable spice production and trade.²¹

ORGANIC SPICES MARKET



¹ Allied Market Research, 2019.

2. Rwandan context

Rwanda has a competitive advantage for agricultural production thanks to its diverse and stable climatological zones and plentiful water resources that allow for year-round production. Moreover, there are other enabling conditions such as the government of Rwanda which is striving to create a conducive environment for foreign direct investment with the continuous development of infrastructure, such as roads and hydro-electricity generation, and several other investment incentives, such as tax holidays and bank loans.

ECONOMY AND DEMOGRAPHY

Rwanda is a relatively small, land-locked country with limited areas of flat land. Moreover, it is densely populated with 12.5 million people living on a total land area of 26,338 square kilometres. The population density in Rwanda is comparable to the situation in the Netherlands and stands at approximately 499 people per square kilometre.²² High population density and population growth result in scarcity of land: average farm size in Rwanda is less than 0.5 ha.

In its Vision 2050, the Rwandan government has set the objective to reach an upper-middle-income status by 2035. The economy has experienced an average growth rate of 8.3 percent since 2000 and has expected growth rates of eight percent until 2022.^m Rwanda GDP was 9,509 billion RWF in 2018, equivalent to 9.26 billion EUR. The agricultural sector accounted for 30.9 percent of the Rwandan Gross Domestic Product (GDP) in 2017. The government's economic growth strategy aims at boosting volumes and value of exported goods in the agricultural sector. This strategy is focusing on increasing productivity and creating added value.

AGRICULTURAL SECTOR

Agriculture is still the main source of income for more than 70 percent of the population. The agriculture sector is characterized by subsistence farming, rain-fed agriculture, challenging land conditions and low productivity. Moreover, post-harvest handling is poor because of limited skills and knowledge. Technologies and methods such as terracing and irrigation are being used in order to increase the resilience of agricultural ecosystems. Agricultural products account for 63 percent of export earnings with coffee and tea as the major export crops. Rwanda's coffee beans were ranked the second-best quality coffee globally by an independent international jury of coffee experts in New York.²³

In Rwanda, the greatest variety of horticulture crops is produced in the Western province. In addition to its strong fruit and vegetable production, a high value category of 'other horticulture crops' is being produced, which includes herbs and spices. 52.5 percent of these specialty horticulture crops comes from the Western province. Two districts should be highlighted: the first is Karongi, which is home to Rwanda's largest macadamia nut producer and the second is Rubavu, a frontrunner in herbs and spices.

NATIONAL DEVELOPMENT STRATEGY

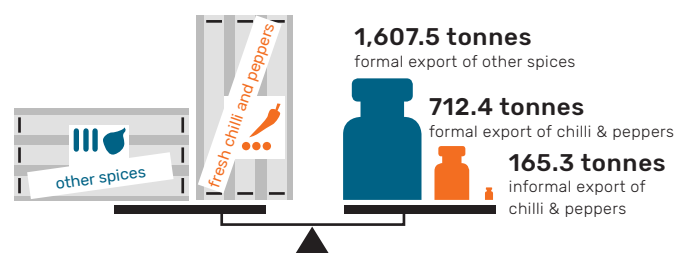
The National Agricultural Policy published in 2018 outlines the development objectives of the Rwandan government. It aims to transform the agricultural sector from 'a subsistence sector to a knowledge-based value creating' sector. Furthermore, the five-year strategy of the National Agricultural Export Board (NAEB) explains how Rwanda will complement steady growth in traditional crops (coffee and tea) with rapid growth of horticulture and other emerging crops. The goal is to focus on the cultivation of high-value crops in high demand across markets. Modernization of the agricultural sector will be realized via the implementation of policies promoting technological upgrading, crop intensification, production of high-value commodities, land registration, organization in farmer cooperatives and decentralization.

The Rwandan government seeks to develop regional Agricultural Commercial Clusters. In Rwanda, the number of locations for large-scale farms supporting a sufficient economy of scale is limited due to the scarcity of flat land and water resources. Recognizing this challenge, the government has proactively developed several land sites for export production. These irrigation projects enable investors to benefit from proximity through the shared infrastructure such as roads, electricity grid, canals and pack-houses. Moreover, they can benefit from scale reaching a certain combined production volume, which makes the construction of all required export infrastructures commercially feasible. Gabiro and Muzanza are two examples of prepared land sites (please review Annexe 1 for more information on prepared land sites).

SPICES AND HERBS

The main spices and herbs produced and consumed in Rwanda are chilli, ginger and garlic. Multiple other spices are imported from neighbouring countries, such as cumin, cinnamon and turmeric.²⁴ Formal and commercialized production of spices and herbs in Rwanda is still limited.²⁵ Chilli is the main export crop; ginger export production has only just started in 2019. Obtained yields at small-scale farms remain low. The main reasons are a lack of training, irrigation and access to agricultural inputs. Smallholder farmers hardly use farming tools or inputs such as pesticides, fertilizers and improved seeds. Moreover, often farmers do not have access to irrigation and electricity.

SPICES EXPORTED IN 2019ⁿ



^m Forecast adjusted to the global Covid-19 pandemic and subsequent economic distress are not yet available for Rwanda.

ⁿ Data provided by NAEB in 2020.

3. Climate, topography and natural resources

TOPOGRAPHY

Rwandan territory equals approximately 26,338 square kilometres and is mostly covered by highlands and hills. Land elevation in the country ranges between 800 and 4,400 m.a.s.l. In the Eastern province and City of Kigali, altitude ranges between 800 and 1,500 (with peaks of 1,600–1,700) m.a.s.l. The remaining areas of the country lie between 1,800 and 4,400 m.a.s.l.

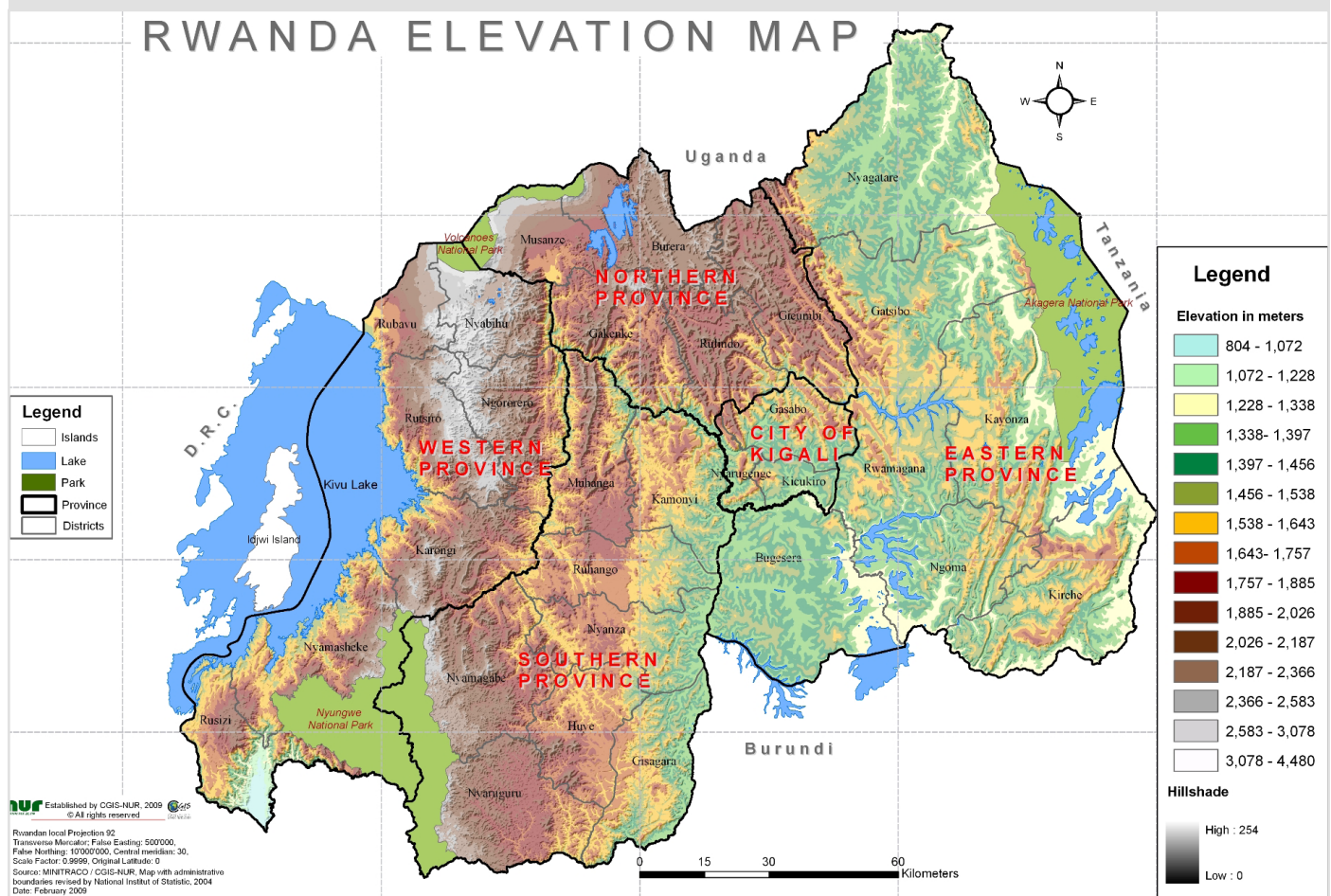
LAND AVAILABILITY

Rwandan territory is about 2.6 million ha, of which approximately one third is used for agriculture. The cultivated area is composed of hillside slopes (660,000 ha) and marshlands (165,000 ha).²⁷ Hillside or sloped areas are usually not fully used in the dry season whereas marshlands are not fully used during the rainy seasons due to flooding.

The cultivation of most spices does not require large land sites as most spices can be intercropped, cultivated by means of outgrower schemes and/or have a higher value per ton in comparison to most other horticulture products. However, a sizeable land site for cultivation might be needed to support an economy of scale.²⁸ Land availability is one of the main challenges for Rwanda because of its high population density. Nonetheless, this challenge is not prohibitive as the government is compiling larger areas and facilitates land acquisition processes.

The Rwandan Ministry of Agriculture and Animal Resources (MinAgri) facilitates arable land identification and acquisition in collaboration with district teams. Land can be either purchased or leased from private parties or from the government (if state-owned) for fixed periods of time. The duration of lease agreements depends on land use; typical lease agreements for agricultural use are for a period of 49 years and are renewable. Please review Annexe 1 for an overview of prepared land sites.

Figure 2. RWANDA ELEVATION MAP²⁶





SEASONS AND RAINFALL

In Rwanda, rainfall volumes vary greatly according to location and season. Generally, two rainy seasons affect the country; the heavy one starts in March and ends in May, and the short one runs from October until November. Total annual rainfalls range from 800 to 1,000 mm in the Eastern Province with some areas registering peaks of 1,140 mm. The map in Figure 3 shows how mean annual rainfalls increase while moving towards the Western part of the country, where they reach 1,700 mm.

Analysis of rainfall trends has shown an increasing occurrence of extremes over time and in various regions of the country. Rainy seasons are becoming shorter and more intense, especially in the northern and western provinces, which increases erosion risks in these mountainous parts of the country. Eastern regions have experienced serious rainfall deficits in a number of years over previous decades, alternated with rainfall excesses in other years.²⁹

IRRIGATION

As the country's agriculture is mostly rain-fed, production is exposed to climatic variation and unreliable rainfall.³¹ Irrigation can be used to intensify Rwanda's agricultural productivity. However, hillside irrigation requires massive infrastructure investment, which cannot be realised by most farmers. Currently, only about one percent of arable land is irrigated.³²

These issues are addressed in the Rwanda Irrigation Master Plan, which aims to increase irrigated areas for cultivation from 48,508 ha in 2017 to 102,284 ha in 2024. The expansion will be realized through the use of different types of irrigation infrastructure such as rainwater harvesting ponds; surface storage reservoir for marshlands; hillside irrigation from surface waters (rivers and lakes) and groundwater.

The government has developed several irrigation sites and private investors are encouraged to own them through leasing, purchase, or to partner with government for management. The New Water Board has been founded to deal with everything incl. applications for agri-irrigation permits.

Figure 3. RWANDA RAINFALL MAP³⁰

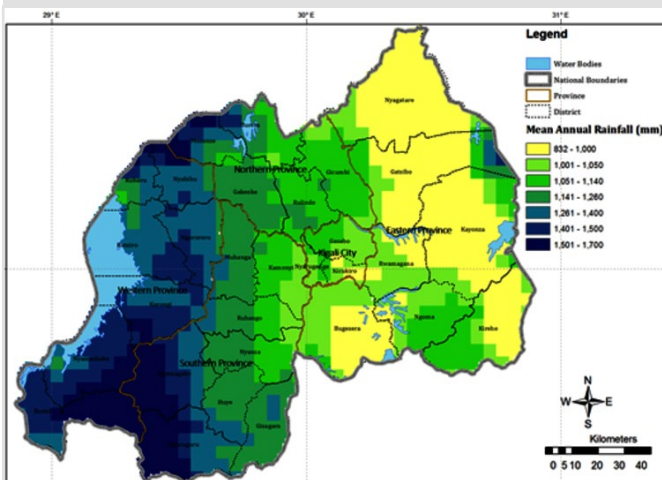


Figure 4. RWANDA AVERAGE TEMPERATURE MAP³³

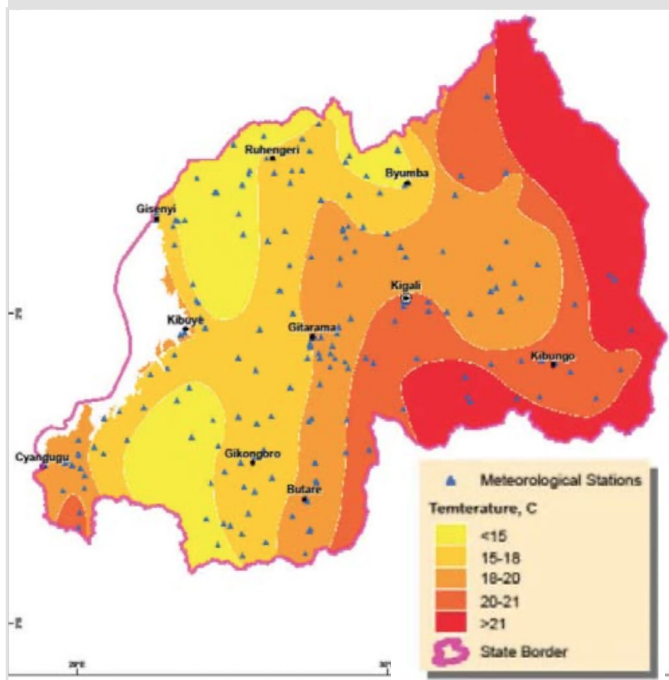
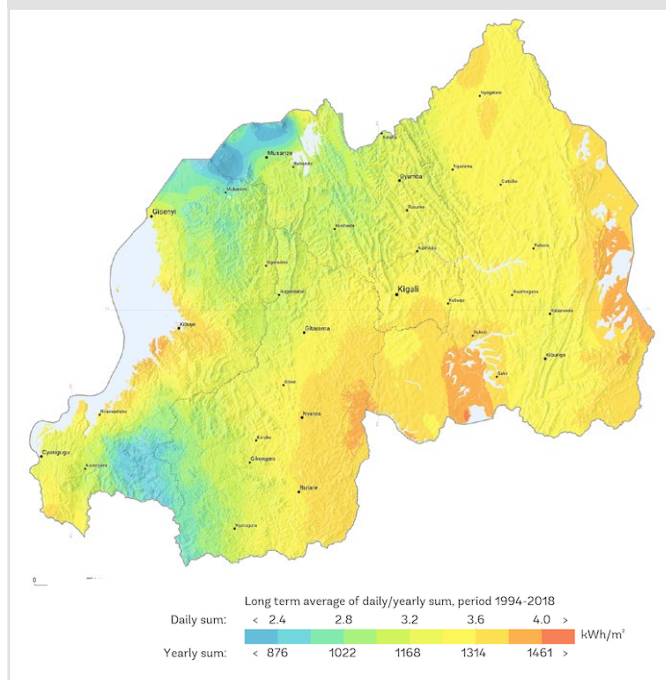


Figure 5. RWANDA AVERAGE DIRECT NORMAL IRRADIATION MAP³⁴



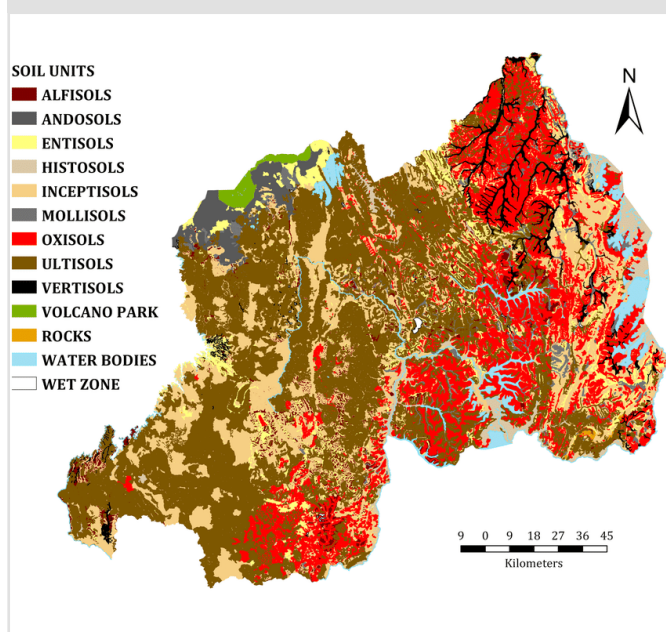
TEMPERATURE

The average temperature in Rwanda varies between 15 and 21 °C, as shown in Figure 4. Figure 5 displays the average direct normal irradiation. The combination of different conditions, e.g. elevation, rainfalls and temperature, constitute different microclimates that are ideal for specific crops.

SOIL COMPOSITION

The majority of soils in Rwanda are clay loams, which are well-drained and very suitable for agricultural production.³⁵ However, the mountainous topography of Rwanda results in a high susceptibility to soil erosion. There are several ongoing initiatives to promote soil conservation measures.³⁶ Soil composition in Rwanda is highly heterogeneous. In general, soils in the western part of the country are either ultisols (reddish, clay-rich, acidic soils) or inceptisols (relatively young soils with a high content of weatherable minerals). Oxisols (red and yellow weathered tropical soils) are dominant in the Eastern and part of the Southern province. Furthermore, there is also great variety in terms of soil fertility. Soils in the western province are highly acidic (pH <5.0), which usually requires correction through lime (aglime) addition.³⁷ Most soils need additional fertilizer application to sustain agricultural production.

Figure 6. SOIL MAP OF RWANDA WITH USDA SOIL TAXONOMY CLASSES³⁸



4. Infrastructure and logistics

Rwanda seeks to become the trade hub of East-Africa. The government has been working with local and foreign partners to upgrade the country's infrastructure to be able to support exports to regional and international markets. The construction of the new airport, 'Bugesera International Airport (BIA),' is ongoing in the Eastern Province in collaboration with Qatar Airlines. The new airport is being built to support regional and international travel and trade. In 2016, the Dubai-based port operator DP World was granted a 25-year concession to develop and operate a new logistics centre in Kigali, Rwanda.

ROAD AND OCEAN FREIGHT

Road freight is the dominant mode of transport in Rwanda supporting for most domestic passenger travel and cargo. The national road network is well-maintained and connects all main production and consumption centres.³⁹ Points of improvement are the rough handling of agricultural goods and lack of temperature management, which results in high losses.

The harbour of Mombasa in Kenya or Dar es Salaam in Tanzania can only be reached by road.⁹ The price of transporting a 40-foot container from Kigali to Mombasa or Dar es Salaam ranges from three to four thousand USD.⁹ Road quality in neighbouring countries is lower plus border crossing delays, port inefficiencies and pilferage may be expected.⁴⁰

⁹ No information regarding an expected date of completion are available.

⁹ Estimated prices by RDB and NAEB for 2019–2020.

RAIL FREIGHT

There are plans to construct a 521-kilometre cross-border railway connecting Isaka in Tanzania and Kigali in Rwanda. The railway should connect Rwanda and Burundi, both landlocked countries, with the inland container terminal of Isaka in Tanzania. The Isaka terminal is linked to Dar es Salaam through an existing metre-gauge railway.⁴¹ The governments of Tanzania and Rwanda have commissioned a feasibility study assessing electrification of the railway.

AIR FREIGHT

Rwanda has competitive airfreight fees for the export of fresh spices and herbs. Air transport links Rwanda to a multitude of destinations across Europe, the Middle East and the African continent. There are direct daily flights to, amongst others, Amsterdam, London, Brussels, Istanbul, Doha, Dubai, Addis Ababa, Nairobi and Johannesburg.⁴² The average cargo capacity for intercontinental flights is four to five tons and two to three tons for regional flights. In January 2020, airfreight costs are by indication 1.35 USD/kg (1.21 EUR) for shipments below 5 MT and 0.95 USD/kg (0.85 EUR) for shipments over 5 MT. A weekly cargo flight operates every Friday from Kigali to Liege (Belgium), with a capacity of 25 MT and priced 1.4 USD/kg (1.25 EUR).⁴³ This is especially relevant for herbs, as they must be shipped fresh after a few hours from harvesting and packaging.

COLD CHAIN

Kigali International Airport has a 30 MT cold storage facility. NAEB runs a recently upgraded packhouse with 120 m² cold rooms, 35 MT storage capacity and a large packing space that allows for simultaneous use by a maximum of six exporters. The packhouse is located in Gikondo (Kigali), seven kilometres from Kigali International Airport. Additionally, there are four regional collection centres; each centre has: 7–10 MT cold room storage capacity, five grading tables each, weighing machines, water and electricity (including back-up generators). These centres are located in Kamonyi, Ngoma, Rulindo and Musanze.⁴⁴ Larger and improved facilities are expected to be completed in 2020 at the new International Airport in Bugesera.⁴⁵



5. Enabling environment and stakeholders

BUSINESS CLIMATE

Rwanda is the 29th easiest place to do business in the world according to the 2019 World Bank Doing Business index of the world's most business-friendly economies. It scores 2nd in Africa, finding only Mauritius ahead. High scores were obtained with regard to starting a business, getting credit and registering property, whilst lower scores were obtained for the enforcement of contracts, resolving insolvency and protecting minority investors.⁴⁶

The country has no statutory limit to foreign ownership or control, nor any official economic or industrial strategy that discriminates against foreign investors.⁴⁷ The government has continued to develop liberal policies to make Rwanda a hub of trade and services. This strategy has been very successful since the country has been considered one of the most reformist states of the past fifteen years. Moreover, Rwanda has a zero tolerance policy when it comes to corruption.⁴⁸ According to United Nations Conference on Trade and Development (UNCTAD) Rwanda has a number of opportunities to attract Foreign Direct Investment (FDI) in niche export sectors with a global orientation, such as tea, coffee, horticulture and others.⁴⁹

More information can be found in the TRAIDE report *'Investing in Rwanda – The Dutch Experience'* (2019) which includes recommendations for new businesses coming to Rwanda on the basis of testimonies of Dutch companies.⁵⁰

GOVERNMENT INSTITUTIONS

The main public stakeholders relevant for investing in Rwanda are the Rwanda Development Board (RDB) and the National Agriculture and Export Board (NAEB).⁵¹ RDB was developed to offer nationals and foreign entrepreneurs and investors a single point of entry in the country, offering support in setting up and running their business. NAEB was specifically established to support business involved in import and export of Rwandan products, mainly in the agricultural sector. The Rwandan Ministry of Agriculture and Animal Resources (MinAgri) facilitates arable land identification and acquisition in collaboration with district teams.

The Rwanda Agriculture and Livestock Inspection and Certification Services (RALIS), a department of MinAgri, is currently responsible for imports of seeds and agricultural inputs.⁵² This responsibility will soon be transferred to the Rwanda Inspectorate, Competition and Consumer Protection Authority (RICA). When crops are already being grown in Rwanda, protocols are in place to evaluate new varieties. For example, chilli seed imports can be arranged within five to twenty days.⁵³ By contrast, importing cardamom seeds might be more complex because there are no existing protocols.

INVESTMENT INCENTIVES

The Rwandan government aims to increase agricultural productivity with a special focus on export products in terms of volumes and value. Moreover, it aims to diversify the country's export base. Seeking to attract more FDI, the Investment Promotion Law from 2015 provides tax breaks and other incentives to investors. Additionally, exporters are provided with incentive packages, such as duty-free privileges for importing necessary equipment, machinery, raw materials and spare parts.

The government has implemented several policies amongst which are the following:⁵⁴

- Export processing zones: designed areas where companies can import duty free as long as the imports are used as inputs for the production of export products;
- Preferential Corporate Income Tax (CIT) rate of fifteen percent, provided that over 50 percent of the production is exported;
- Preferential Corporate Income Tax (CIT) rate of zero percent if the company headquarters are based in Rwanda;
- Exemption from Capital Gains Tax (currently five percent of the gain);
- Duty-free imports of agricultural inputs, such as seeds, fertilizers and pesticides;
- Duty-free import of (farm) machinery, tools, irrigation equipment, and greenhouse materials;
- Accelerated depreciation of 50 percent for new or used assets in year one for agro-processing and export-oriented businesses;
- No export taxes or VAT on horticulture exports;
- Rwanda Horticulture Working Group (RHWG), launched in 2015 by NAEB. RHWG works as an informal platform for dialogue between stakeholders in the sector and as a formal channel for discussions with the Government.

LABOUR

As most spices and herbs require handpicking and careful handling, labour costs are an important factor determining production costs. The labour force of Rwanda counts almost 3.8 million people. This is roughly one third of the Rwandan population of 12.2 million, that grows by 2.3 percent annually. The rural population is estimated at 83 percent of the total population. Moreover, almost 41 percent of the population is under the age of fourteen.⁵⁵ Therefore, the labour force is plentiful and growing, and labour costs in Rwanda are competitive in comparison to its neighbouring countries. In Rwanda, casual labour generally costs 1.5–2.00 USD/day (1.34–1.79 EUR), while specialist staff is paid a net salary of 200–450 USD/month (177–403 EUR). In Kenya, the average daily wage is 2.50–5.00 USD (2.23–4.47 EUR).⁵⁶ Mr Ramkumar Menon, member of the Management Committee of AISEF (All India Spices Exporters Forum), acknowledges the advantages of the Rwandan labour force, but also stresses the need to “train and educate farmers, processors and exporters on quality aspects.”⁵⁷

DEVELOPMENT COOPERATION

Many donors consider horticulture value chain development an excellent way to stimulate economic growth in Rwanda while simultaneously reducing poverty and malnutrition. Development programs seek to identify and resolve market failures providing funds, agricultural expertise and market linkages. New and existing flori- and horticulture companies in Rwanda can benefit from the resources and network of development organisations.

The International Trade Centre (ITC) has been involved in the Rwandan spices sector since 2015. Together with the UK’s Department for International Development (DFID), ITC started a program for Supporting Indian Trade and Investment for Africa (SITA), that aims at stimulating South-South cooperation in five sectors, amongst which are spices. SITA focuses on farmers capacity building, land location, farmer mobilization and provision of (low-tech) technologies for spices processing. On the other side, companies take care of the provision of (hybrid) seeds, seedlings production in central nursery and facilitate access to finance for farmers to arrange prepayment of seeds. SITA closely works together with NAEB, that carries out soil analyses and facilitates seed imports.^{58,59}

PRODUCT STANDARDS

Food safety and product quality are top priorities in the EU, and spice imports need to comply with regulatory and voluntary standards. Although there are audits at the warehouses and ports in Rwanda, the most common reason for rejection of Rwandan exports by the EU is its inability to meet European product quality standards.

In the case of exports from Rwanda, products are audited on several parameters, such as colour, weight, size, purity, moisture and container conditions, mostly at warehouses and ports (either departure or entry). In many cases, a check on contaminations (such as aflatoxin) is performed. Several public authorities, are responsible for regulating, inspecting and testing of food products deemed for export. However, many international buyers or exporters prefer the services of private inspection companies who often have better equipment, skilled staff and are more efficient.



6. Spices and herbs

This report has evaluated the commercial potential of multiple spices and herbs in Rwanda. The following spices are included in the report: black pepper, cardamom, chilli, ginger, paprika, rosemary and vanilla. Other spices and herbs (turmeric, nutmeg, lemongrass and saffron) were assessed but deemed limited because of less favourable climatological conditions and/or market factors.⁹ For each spice below, placed in alphabetical order, the potential in terms of production and market is discussed.

BLACK PEPPER



Production

Black pepper grains are obtained by drying mature berries of the piper nigrum perennial flowering vine. The vines grow in hot and humid climates around the Equator (between twenty degrees North and South latitudes). Lands from sea level up to 1,500 m.a.s.l and temperatures between 10 and 40°C are optimal. The mean temperature should range between 25 and 32°C. Well-distributed rainfalls around 2,000 mm are ideal for high yields, relative humidity is ideal at 65 to 95 percent. Long dry periods are unfavourable for the pepper vines. The vines grow in several types of soils, ideally in well drained brown red latosols or andosols, with pH between 4.5 and 6.9.⁶⁰

Black pepper vines can be grown under the same conditions as coffee and tea, which are Rwanda's major export crops. Moreover, black pepper can be intercropped with the coffee trees (at lower altitudes) or integrated in other agroforestry projects.⁶¹ Alternatively, black pepper vines can be grown as a monocrop on hillsides. A disadvantage is the long, inevitable investment period: it takes around two years to grow the black pepper vines (and produce the first berries) plus it takes five years before production reaches its full potential.⁶²

Market

The global black pepper market is growing a steady pace. It is expected to register healthy growth during 2018–2026. The market is driven by increased spending on food products, increase in disposable income in developing countries, especially China.⁶³ Average annual global consumption of black pepper counted 351,000 MT from 2010–2013 and it is expected to increase to 410,000 MT for 2022–2025. EU imports of black pepper were not affected by significant increases of price levels and economic crisis of 2008. Between 2009 and 2013, European consumption of black pepper continued to increase by 2.4 percent each year. Nonetheless, black pepper production and exports are shifting between countries. Multiple countries around the world are involved or currently investing in black pepper production and this might depress market prices in the future.⁶⁴

⁹ Please contact the TRAIDE team via email for more information: Gertjan Beccx (gertjan@resiliencebv.com) and Emily ter Steeg (emily@resiliencebv.com).

CARDAMOM



Production

Cardamom refers to multiple spices made of the seeds of different plants. The most diffused are *green or true or small cardamom (Elettaria cardamomum)* and *black or large cardamom (Amomum Costatum, Amomum subulatum)*. Green and black cardamom are consumed dried; either grinded or as a whole (pods or seeds). It is also possible to extract essential oils. Some African cardamoms (genus *Aframomum*, in Madagascar, Somalia and Cameroon; another member of this genus is the pungent west African spice grains of paradise) have a similar taste and appear sporadically on the western market.

Green cardamom grows best on deep black loam soil with high humus content, usually found in forests. It also grows on laterite soils, clay loams and rich black soils having good drainage. Sandy soil is not suitable.⁶⁶ The favourite climate of green cardamom is tropical, with constant moisture and – ideally – constant temperature around 22°C. It suffers at temperatures below 10°C. Green cardamom thrives at altitudes between 600 and 1,500 m.a.s.l., possibly in filtered shade.⁶⁷

Black cardamom grows best in humid climates, shaded by taller trees, in lands between 800 and 2,000 m.a.s.l. Moderate to strong rainfalls (average precipitation of 3,000–3,500 mm spread over about 200 days) and temperatures between 6 and 30°C are ideal. Black cardamom plants mature during the third year of their growth, when flowers and fruits are produced.⁶⁸

A disadvantage for farmers is the long investment period. It will take at least three years before cardamom cultivation becomes profitable: the plants normally start bearing capsules from the third year of planting. Intercropping schemes might offer a solution to mitigate dependence on one crop. Cardamom plants can be intercropped with trees that provide shade and, ideally, have flowers to attract bees; the main pollinators for cardamom.⁶⁹

Market

About 60 percent of the world's production green cardamom is exported to Arab countries (North Africa and Middle East), where the larger part is used to prepare coffee. The demand on the European market for cardamom is slowly growing. Between 2013 and 2017, European imports of cardamom sourced from developing countries decreased by two percent on average in terms of volume. However, they increased by thirteen percent per year in terms of value, resulting in a price increase of cardamom.⁷⁰

There is no cardamom production in Rwanda. Rwandan producers would have to compete with cardamom from Tanzania (Zanzibar), which is considered a top producing country of cardamom.⁷¹ The world's main exporter of green cardamom is Guatemala. However, the country did not manage to keep up its production rates in the past years due to weather conditions and pests.⁷² In Europe, the main importers and consumers of cardamom are the UK, Germany, the Netherlands and Scandinavian countries. Most imports are made of whole cardamom pods or seeds, but the food processing industry also buys significant amounts of crushed cardamom.

CHILLI



Production

Bird's eye chilli (*Capsicum frutescens/Capsicum annum*) plant is a perennial branched bush with a production life of two to three years. It thrives in climates where temperatures range between 18 and 27°C during the day and 15 and 18°C during the night.⁷ High yields are obtained with rainfall of 600 to 1,250 mm, well distributed over the growing season. It grows best on well drained moderately fertile soil, with a pH between six and seven.

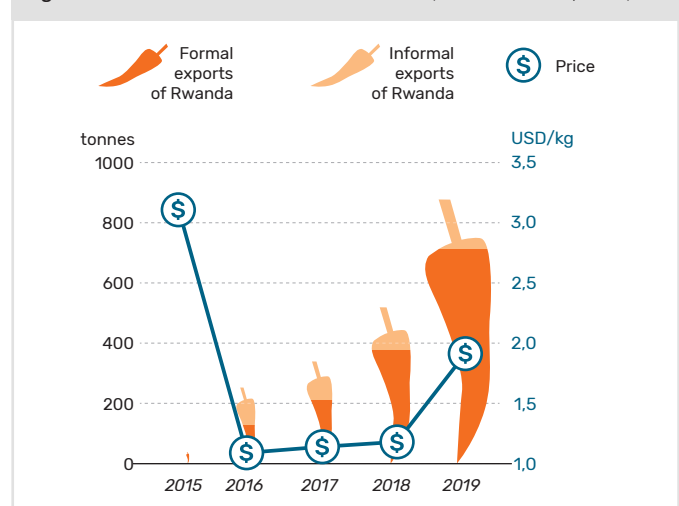
Three months after transplanting the first harvest can occur. The fruits should be harvested manually and require careful handling given the irritating substances they carry. Subsequently, the chillies can be dried for four to seven days on a rack with free movement of air. For storage purpose, red ripe chillies are semi-dried for three to fifteen days under open sunlight, covered and stored at room temperature (28 to 30°C).⁷³

Market

Bird's eye chilli is traded both fresh and dried, either as entire fruit or powder. Rwandan chili is mostly exported to India. SITA has attracted and assisted five major Indian companies to invest in chilli production in Rwanda, which exported 96 tonnes in 2019. They are currently growing on 200 ha including 40 ha of organic chilli. In India, the dried chillies are used for flavour or colour extraction obtaining capsaicin and pigment. There is no processing plant in Rwanda for pepper powder.⁷⁴

Worldwide, the main exporter of dried chilli is India, with an export volume of 361,499 tons in 2019 (649 million USD). India exports 40 percent of its production to China, which in turn exports 72,025 tons towards Mexico, south-east Asian countries and the US.⁷⁵ These countries have enormous production volumes and low production costs. Hence, it will be difficult for Rwandan dried chilli increase profitability.

Figure 7. ANNUAL CHILLI EXPORTS RWANDA (SOURCE: NAEB, 2020)



⁷ These are temperatures measured during the growing season.



TRAIDE

Case study

Bird's eye chilli in Rwanda



Chilli is currently one of the main spices grown and consumed in Rwanda. Four types of chilli are grown in Rwanda: bird's eye, red, orange and yellow. Chilli is produced mostly in Bugesera and Rusizi.⁷⁶ There are several types of farmers involved in the chilli production:

- Independent smallholders – small number of individual farmers serving the local and regional markets
- Out-growers and cooperatives – large groups of smallholder farmers working together with larger exporters/buyers
- Medium-size farms – *agri-preneurs* producing large quantities of chilli for export.

Rwandan chilli is being exported to neighbouring countries (Burundi and Democratic Republic of the Congo) and European countries (UK and France). There are around 20 chilli exporting companies in Rwanda.⁷⁷ Gashora Farm is one of the key chilli producers in Rwanda exporting to the US, Belgium, France and India.⁷⁸ GET IT is another large and upcoming producer in Rwanda. They produce fruits and vegetables with

outgrowing schemes and produce (dried) chilli and ginger for export. Moreover, GET IT is focusing on organic chilli production for the US market.

Different partners are needed to turn remaining challenges into opportunities. Increased local inputs and new irrigation schemes could improve chilli yields and quality.⁷⁹

- Chillies are subjected to stringent quality checks in Europe, which Rwandan exporters are currently struggling to pass; they face high rejection rates.
- Around the world chilli can be produced year-round and hence, Rwanda has a limited seasonal competitive advantage.
- Scale of production in Rwanda is insufficient to gain the interest of the private agro-input providers.
- Smallholder farmers need training regarding best practices and financial access to buy fertilisers and other inputs.
- There is a lack of facilities to dry, store and process chillies making the quality of products dependent on weather conditions.



GINGER



Production

Ginger (*Zingiber officinale*) is a perennial herb composed of underground rhizome (root) and pseudostems that bear narrow leaves. Ginger is a tropical plant and therefore needs warm and humid climates, with a minimum average temperature of 30°C. Partial shade is recommended. Ginger requires well distributed rainfalls or irrigation (1,500 to 3,000 mm) during growing season and dry spells during land preparation and harvesting. Ginger plants thrive in well drained soils – ideally lateritic loams – from sea level to 1,500 m.a.s.l.⁸⁰

It is recommended to rotate ginger with leguminous plants in order to increase N and organic matter levels. Alternatively, it can be grown as an inter-row crop between legumes and macadamia nuts⁸¹ which provide partial shade and a more humid microclimate. Fresh ginger production requires the crop to be harvested six to seven months after planting; when the rhizomes have a lower fibre content. Ginger used for drying is harvested seven to ten months after planting. On large ginger farms, harvesting can be done via mechanical lifting; this is a usual method for other root crops such as potatoes.⁸²

Market

Ginger's root is widely utilized as a spice, either fresh, dried (in pieces or grinded) or pickled. Essential oil and extract can be derived from the roots. In Rwanda, ginger is mostly used for tea (ginger or African) and meat preparation.⁸³ Rwandan ginger varieties have small roots and are considered suitable for extraction.⁸⁴ SITA is currently running trials with an Indian company for extract production.⁸⁵ Tanzanian varieties have larger roots and are preferred when producing fresh ginger. GET IT is currently the only commercial company exporting ginger to South Africa.

The food-processing industry accounts for 70–80 percent of the European ginger consumption. Western European countries account for 55 percent of consumption with the biggest consumers being the UK (33 percent), Germany (10 percent) and the Netherlands (10 percent). European demand and imports of ginger are expected to continue to grow on the long term.⁸⁶

PAPRIKA



Production

Paprika (*Capsicum annuum*) is grown on semi-perennials bushes that can be grown as annuals in commercial cultivation. Different varieties yield different fruits, some of which are defined as *sweet*, or, more precisely, *non-piquant* (e.g. sweet paprika). Capsicums grow best with day temperatures of 24 to 30°C and night temperatures of 15 to 17°C. Paprika grows in a variety of soils, preferring richer ones.⁸⁷

Soils must be well-drained and have pH of 5.0–6.0 and low salinity. Capsicums benefit from rainfalls between 600 at 1250 mm. Depending on the variety and climate conditions, capsicums grow between 0 and 2000 m.a.s.l. Capsicums can be intercropped with several other crops, amongst which *Alliaceae* (onion family), *Brassicaceae* (mustard family) and *Fabaceae* (legume family).⁸⁸

The capsicum fruits are usually ready for harvesting ten to fifteen weeks after planting. The fruits should be harvested manually and require careful handling. Depending on the variety, fruits can be consumed and therefore sold fresh or dried, usually in powder (e.g. for sweet paprika). Moreover, oleoresin in paprika can be extracted and used as natural dye and/or flavour agent for the food and beverage industry. The main challenge for sweet paprika production is cross-pollination with chillies.⁸⁹

Market

China, Peru and the US are the world's main producers of sweet paprika, and are responsible for 67 percent, 17 percent and 10 percent of global production. Global demand for sweet paprika is high and steadily increasing. Mexico, south-western US and southern Europe are the most prominent markets for whole paprika fruits, counting for seventeen percent of the total demand. Ground paprika and chilli blends make up about half of global demand (mostly North America and Europe), while oleoresins are responsible for about one third of demand.⁹⁰



ROSEMARY



Production

Rosemary (*Rosmarinus officinalis*) is a woody and aromatic herb that can live for fifteen up to twenty years. The plant is originally from the Mediterranean area, where average temperatures of 20–30°C during spring-early summer are common. Soil temperatures above 18°C favour growth and regeneration after harvest. However, the plant is resilient and can tolerate lower temperatures as well. It grows well in frost-free, tropical and subtropical climate, with a high rainfall (2,000–2,500 mm) at an altitude of 2,500 m.a.s.l.⁹¹ Rosemary plants can grow in all well-drained soils. They can withstand pH from 5,5 to 8.⁹² However, the best yields are often achieved in fertile sandy to clay loam soils with pH close to 7.0 and very good drainage.⁹³

Market

Growing rosemary plants in order to harvest fresh/dry stems or essential oil has gained popularity in the last two decades. There are two reasons why rosemary has become trendy. Firstly, rosemary essential oil is being used in a variety of industries and at times, it can be difficult to meet rising demand. Secondly, the plant is fairly easy to grow, and rarely suffers from diseases. Once established, healthy and mature plants can produce sustainably good yields for over a decade. There is ongoing rosemary production in Rwanda for extraction and essential oil production.⁹⁴ Optimistic scenarios project the global market for rosemary extracts will grow by 4.8 percent.⁹⁵

VANILLA



Production^{96,97}

Vanilla (*Vanilla planifolia*, *Vanilla tahitensis*) is a climbing vine of the orchids family that bears flowers and pods that contain a multitude of small seeds. Vanilla vines grow in hot and moist tropical climates. Natural growth is obtained at latitudes 15 degrees north and 20 degrees south of the Equator. The optimal temperatures range between 21 and 32°C and altitudes between 0 and 1,000 m.a.s.l. Partial shade is essential and light, porous and friable soils with pH between 6 and 7 are preferred. The vines thrive with well-distributed rainfall, for a total of 2,000 to 2,500 mm annually.⁹⁸

Vanilla vines require a dry period of two months, in order to restrict vegetative growth and induce flowering. Harvest occurs when pods are mature, which takes roughly nine months. Pods are then wrapped and subjected to high temperatures and humidity to ‘kill’ the vegetative life. Afterwards, vanilla pods are drying in the sun by day and sweating by night for several days, before being slowly dried in the shade for up to two months. Finally, pods are sorted, graded and placed in chests for a conditioning period of one or two months. In addition to this lengthy process, the propagation of vanilla vines requires manual pollination; hence high complexity explains the high price per kilo, which is over 500 USD.⁹⁹

Market
















Madagascar is the world’s main producer and exporter of bourbon vanilla, the most prestigious variety. In 2019, Madagascar exported 1,453 tons of bourbon vanilla, worth 573 million USD accounting for more than half of the world’s vanilla exports.¹⁰⁰ However, the demand for vanilla is steadily increasing. In East Africa, vanilla is currently grown in Uganda, and trials have been developed in southern Ethiopia.¹⁰¹























7. Investment opportunities

This chapter offers an overview of investment opportunities in the spices and herbs sector in Rwanda. Firstly, opportunities are identified for specific crops on the basis of climatological, labour and market conditions in Rwanda. Secondly, general opportunities in the Rwandan spices sector are identified in terms of production, processing and business models/financing.

INDIVIDUAL CROPS

Crop	Compatibility with Rwandan climate (low/medium/high)	Labour intensity in terms of cultivation (low/medium/high)	Suitability to outgrower schemes (low/medium/high)	Market potential (low/medium/high)	
 CHILLI	<p><i>Temperature:</i> 27°C (day) –15°C (night)</p> <p><i>Rainfall:</i> 600–1,250 mm</p> <p><i>Altitude:</i> <1800 m.a.s.l.</p> <p><i>Soil:</i> Well-drained, moderately fertile soil</p>	<p>MEDIUM </p> <p>City of Kigali</p> <p>Eastern province (temperature may be too high along the borders with Tanzania and Burundi)</p> <p>Southern province (excluding Nyamagabe and Nyaruguru districts)</p> <p>Northern province (excluding Burera district and northern part of Musanze district)</p>	<p>HIGH </p> <p>Production requires frequent scouting.</p> <p>Pesticides and insecticides need to be applied manually underneath the leaves.</p> <p>Manual harvesting is required.</p>	<p>HIGH </p> <p>Ideally, farmers would bring fresh chillies to a central hub, where chillies can be sorted and dried.</p>	<p>HIGH </p> <p>Global demand for dried chilli is growing.</p> <p>There are also opportunities to obtain premiums for the export production of fresh and organic chillies once farmers manage to improve product quality.</p>
 BLACK PEPPER	<p><i>Temperature:</i> 25–32°C</p> <p><i>Rainfall:</i> >1,000 mm</p> <p><i>Altitude:</i> <1,500 m.a.s.l.</p> <p><i>Soil:</i> well-drained brown red latosols or andosols</p>	<p>MEDIUM </p> <p>City of Kigali</p> <p>Eastern province</p> <p>Southern province (excluding Nyamagabe and Nyaruguru districts)</p> <p>In dry areas, production will require irrigation.</p>	<p>HIGH </p> <p>Production requires frequent scouting. Vines are susceptible to diseases and pests.</p> <p>Spikes are harvested when the first grains start changing colour.</p> <p>Grains are separated from the spike manually.</p>	<p>MEDIUM </p> <p>Outgrowers would need training: cultivation requires specific knowledge and skills.</p> <p>Vines can be integrated in existing agroforestry projects. Also, the vines can be planted on slopes.</p>	<p>MEDIUM </p> <p>Global demand is steadily growing but supply has increased in the past year affecting profitability.</p> <p>Intercropping schemes or agroforestry projects offer low-risk investment opportunities for established producers.</p>
 CARDAMOM	<p><i>Temperature:</i> 22°C (10–30 °C)</p> <p><i>Rainfall:</i> >2,000 mm (well-distributed)</p> <p><i>Altitude:</i> 600–1,500 m.a.s.l.</p> <p><i>Soil:</i> black loam soil with high humus content. Laterite soils and clay loams are also suitable provided there is good drainage</p>	<p>HIGH </p> <p>City of Kigali</p> <p>Eastern province</p> <p>Southern province (excluding Nyamagabe and Nyaruguru districts)</p> <p>Production will always require irrigation because rainfall is not sufficiently distributed.</p>	<p>HIGH </p> <p>Production and harvest can not be mechanized.</p> <p>During harvest each pod needs to be picked at the exact right moment.</p>	<p>MEDIUM </p> <p>Outgrowers would need extensive training: cultivation requires specific knowledge and skills.</p> <p>Plants can be integrated in existing agroforestry projects.</p>	<p>MEDIUM </p> <p>Global demand is growing slowly but steadily. Global supply has been unstable, and this offers opportunities for new investors.</p> <p>Rwandan cardamom would compete with high-quality Tanzanian cardamom and established producers.</p>

Crop	Compatibility with Rwandan climate		Labour intensity in terms of cultivation	Suitability to outgrower schemes	Market potential
	(low/medium/high)		(low/medium/high)	(low/medium/high)	(low/medium/high)
 GINGER	<p>Temperature: around 30 °C</p> <p>Rainfall: 1,500 to 3,000 mm (dry spells during land preparation and harvest)</p> <p>Altitude: 0–1,500 m.a.s.l.</p> <p>Soil: well-drained soils and ideally lateritic loams</p>	<p>HIGH </p> <p>City of Kigali</p> <p>Eastern Province</p> <p>Southern province (excluding Nyamagabe and Nyaruguru districts)</p> <p>Northern province (excluding Burera district and northern part of Musanze district)</p> <p>In dry areas, production will require irrigation.</p>	<p>MEDIUM </p> <p>Production requires constant scouting, and most processes are manual.</p> <p>Harvesting can be done via mechanical lifting.</p>	<p>MEDIUM </p> <p>Mechanical harvest is possible in larger plantations – when using outgrower schemes this advantage is lost.</p>	<p>HIGH </p> <p>Global demand is expected to grow, and prices are slowly rising.</p> <p>Rwandan local varieties can be used for extraction whereas Tanzanian can be used for fresh ginger production.</p>
 PAPRIKA (SWEET)	<p>Temperature: 24–30°C (day) and 15–17°C (night)</p> <p>Rainfall: 600–1,250 mm</p> <p>Altitude: 0–2,000 m.a.s.l.</p> <p>Soil: variety of soils preferring richer ones</p>	<p>HIGH </p> <p>City of Kigali</p> <p>Eastern Province</p> <p>Southern province (excluding the very western areas of Nyamagabe and Nyaruguru districts)</p> <p>Northern province (excluding Burera district and the northern part of Musanze district)</p>	<p>MEDIUM </p> <p>Production requires frequent scouting.</p> <p>Paprika needs to be harvested manually (unless it is grown on very large flat lands).</p>	<p>LOW </p> <p>Risk of contamination (cross-pollination) is too high when chilli is also being grown in the area.</p>	<p>HIGH </p> <p>Global demand is expected to grow steadily (CAGR of 5.3% until 2025).</p>
 VANILLA	<p>Temperature: 21–32°C</p> <p>Rainfall: 2,000–2,500 mm (well-distributed)</p> <p>Altitude: 0–1,000 m.a.s.l.</p> <p>Soil: Porous and friable soils (pH 6–7) are preferred</p>	<p>MEDIUM </p> <p>City of Kigali</p> <p>Eastern province</p> <p>Southern province (east)</p> <p>In dry areas, production will require irrigation.</p>	<p>HIGH </p> <p>Manual propagation is required, after harvest activities are crucial for the development of the vanilla flavour.</p>	<p>LOW </p> <p>Highly specific cultivation knowledge is needed.</p> <p>Outgrower schemes tend to result in varying quality levels and hence, overall reduced quality. Risks become too high when using outgrowers.</p>	<p>HIGH </p> <p>Global demand for vanilla is high and continues to grow.</p> <p>Market prices remain high because of the limited number of producing countries. However, global supply might increase in the coming years.</p>
 ROSEMARY	<p>Temperature: >0°C (frost-free, subtropical and tropical)</p> <p>Rainfall: 1200–2500 mm</p> <p>Altitude: 0–2500 m.a.s.l</p> <p>Soil: fertile sandy and clay-loam soils (pH 7) and well-drained</p>	<p>MEDIUM </p> <p>City of Kigali</p> <p>Eastern province</p> <p>Southern province</p> <p>Northern province</p> <p>Drier areas are preferred; drainage makes cultivation feasible across Rwanda.</p>	<p>LOW </p> <p>Rosemary cultivation and harvest can be mechanized.</p>	<p>MEDIUM </p> <p>Rosemary is relatively easy to cultivate.</p> <p>Rosemary is mainly produced on larger (monocrop) fields allowing for mechanized harvest.</p>	<p>MEDIUM </p> <p>Demand in Europe is growing and there are some opportunities to tap into niche markets such as essential oils.</p> <p>Additionally, there is demand on the Indian market using rosemary for extraction.</p>



PRODUCTION

Outgrower schemes

Benefits of outgrower schemes are improved quality control and post-harvest management. Moreover, farms can pay relatively lower prices because they source directly from the farmers. Nonetheless, it can be challenging to maintain a consistent quality of crops through the effective management of outgrowers. Often farms need to hire extension officers who provide training and support.

Rwanda's Strategic Plan for Agriculture Transformation (PSTA4) states:

“Outgrower schemes, also known as contract farming, are broadly defined as binding arrangements through which a firm ensures its supply of agricultural products by individual or groups of farmers. Farm households participating in outgrower schemes will be tracked and reported separately from other forms of private advisory services.”

In Rwanda, land resources are scarce and most large commercial farms work with outgrower-schemes to scale-up production. They serve as a ‘nucleus farm’: sourcing spices from farmers nearby and providing them with training and inputs in return. This exchange is important because farmers usually are unable to buy all inputs required to maximize yields and quality. Outgrower-schemes are implemented both with and without contractual agreements.

The Rwandan chilli sector uses a decentralised model. Farmers and exporters have the right to negotiate their own agreements. Exporters/buyers can get into contact with farmers directly. Conflicts are solved by the two parties and sometimes local authorities are involved. NAEB will get involved whenever major issues arise.

Intercropping

Intercropping of spices with other crops that are well-established and with an efficient value chain is promising. Intercropping can diversify farmers livelihoods and reduce their dependency on a single crop as well as steep seasonal income fluctuations. Intercropping schemes or integration in agroforestry projects offer low-risk investment opportunities for established producers.

Tunnels and greenhouses

Tunnels and greenhouses might be required for the production of quality-A and -B crops (especially fresh chillies). Producers will be able to maintain a constant and higher quality level using the protective structures. Rainfall in Rwanda is becoming more intensive falling in shorter periods, which can damage crops. Also, producers can start to grow crops, which are too vulnerable to be grown in the open field.

Organic production

Rwandan lands are suitable for organic production. There is still a fair amount of virgin land available for agricultural production. Some Rwandan farmers are ‘organic-by-default’ because of their limited financial access to chemicals. Additionally, there is an increasing number of organic farmers who consciously decide to produce organically to protect their land (natural resources) and obtain premiums. Organic farmers can often get support via an NGO project to obtain certification. By contrast, coffee, tea and potato farmers tend to use high quantities of agro-chemicals.

Good agricultural practices

A fundamental challenge in the Rwandan spices sector is technical expertise and experience of farmers. Farmers practicing subsistence agriculture will need training to obtain the required knowledge and skills to grow and handle certain high-value crops. Large investments will need to be paired with training. These training programs can likely be developed and implemented with the (financial) support of development organizations (such as DFID, GIZ or USAID) and/or extension services. Alternatively, trainings can be organized via businesses with extensive experience organizing field days and developing demo-plots. In Rwanda, One Acre Fund (non-profit) or Holland Greentech have large farmer networks.

Smart-farming technology

Basic technological solutions can help supporting farmers and monitoring quality. In Rwanda, offline and online smart-farming tools are upcoming. Applications provide farmers and/or extension workers with access to information related to weather data, agricultural inputs, market prices or user-data. Certain farmer cooperatives also use apps to provide their members with quality test results and payment information. Spices producers can introduce smart-farming tools to support their outgrower schemes. Similarly, it might be possible to develop and introduce such tools with the (financial) support of development organizations.

PROCESSING AND LOGISTICS

Most spices and herbs are not consumed fresh and are added to foods in very small quantities. Thus, their preservation overtime is required: spices and herbs are often dried and, in certain cases, grinded before being exported and packaged for retail. If organized locally, drying and grinding will strongly increase the export value.

Drying

To date, professional drying facilities are not present in Rwanda and farmers depend on sun drying. So far exporting companies mostly focus on colour extraction and the colour of chillies can be affected by industrial dryers; hence no investments have been made. Future exporters could make such investment. A dryer enables them to produce year-round. Chilli producers plant their crop in January and harvest in June, July or August. They depend on the dry season, which is increasingly unpredictable. Chilli producers recognize dryers are required to support scale: without industrial drying producing large amounts of any crop is risky.

Several types of drying techniques exist; mechanical drying, e.g. forced air drying, is the most diffused. It can be performed either with hot or lukewarm air. Infrared drying is currently the most advanced technology, as it maintains the highest amount of nutrients and properties of the different plants. Whilst a basic dryer costs around 10,000 USD, infrared drying facilities require a minimum investment of 1 million USD. There are also mobile drying facilities, which can be used around the country.

Storage facilities

In Rwanda, storage facilities are of variable quality while the climate is hot and humid resulting in high post-harvest losses. Aflatoxin can flourish when crops are subjected to insufficient drying followed by poor storage conditions. EU requirements are very strict for aflatoxin. Industrially dried spices do not require advanced storage facilities. However, improved climate-smart storage facilities are needed to support the export of fresh herbs.

Grinding and crushing

Large scale-grinding and crushing is increasingly taking place in producing countries (India, Vietnam, China) in Asia, because of low labour costs and improved processing facilities and detection techniques. The Government of Rwanda is actively promoting to support investments that add value to the value chain of agricultural products.

Cold chain

NAEB has put in great effort to set up a proper cold chain – with cold trucks and cold storages in several provinces of the country. Nevertheless, it must be noted that existing public cooling facilities cannot facilitate high volume exports due to a lack of scale. Available storage and cold transport facilities are frequently running at maximum capacity. There are no additional commercial cold stores. Moreover, blast freezers are currently not present in the country and needed to preserve fresh herbs. Aggregation of cold-chain activities is feasible because all facilities can also be used for horticulture products.

Steam sterilization

EU buyers are increasingly asking for steam-sterilized spices combatting micro-biological contamination. An important disadvantage of steam sterilization is that it negatively affects volatile oil content, which reduces flavour. Proof of steam sterilization at the source can provide suppliers with access to a significant premium of 0.20 USD/kg. Steam sterilisation facilities are relatively costly compared to rural cleaning and grading facilities. A considerable investment of up to 1.1 million USD is needed. Potential investors should also take into account that steam sterilization can only be effective if food safety standards are also upheld during drying, storage, packaging and transport.

Packaging

In 2008, Rwanda already banned the use of plastic bags. In 2020 Rwanda has implemented a ban on all single-use plastic. This ambitious law has major environmental benefits, but it also poses a challenge. Business can help introduce or develop innovative solutions, which enable processors to meet new environmental requirements while also continue to offer affordable products.

Exemptions are granted to export producers when plastic packaging will not remain in Rwanda. It is recommended to negotiate specific conditions beforehand with the Rwanda Environmental Management Authority (REMA) with regard to the packaging needed for export products.

Aggregation

Aggregation of processing is possible when commercial players collaborate. Processing facilities such as industrial dryers can be used by multiple exporters. For example, dryers used for spices can also be used for the dehydration of exotic fruits (such as pineapple, mango and papaya). Multi-purpose processing facilities will more easily support economies of scale.



ANNEXE 1 DETAILS PREPARED LAND SITES

Field site name	MUYANZA	GABIRO
GEOGRAPHY/CLIMATE		
Province / location	North	East
District	Rulindo	Gabiro
GPS point (latitude)		-1° 18' 36"
GPS point (longitude)		30° 33' 22"
Land available (ha)	1150 ha irrigated 1450 ha of non-irrigated (200 is being used)	Phase I: 5,600 (30% goes to local community) up to 15,600 ha
Flat land available (ha)		2240–2800
Max temperature (day) ±0.5	26	26.6–27.9
Min temperature (night) ±0.5	15	11.7–14.2
Rainfall range (mm/month) (peaks)	0–173 mm	0–125 mm (peaks up to 270 mm)
Rainfall (mm/year) (min-max)	1183 mm	850 mm (660–1170)
Altitude (m)	1655 (in the area: 1500–2200)	1319
Soil type	Clay loam / sandy loam	Clay loam (some newly deforested land)
OWNERSHIP/USE		
Current land owner	About 12,000 farmers; 150 ha is state-owned	Communities/about a 1000 private individuals
Land acquisition possibilities	Pay wages and share profits / potentially leasing possibilities	Lease fee: 350–400 USD/ha for plots of 100–300 ha
Current land management	MinAgri and LWH Irrigation Project (LWH)	Gabiro Agribusiness Hub Ltd (government owned)
Land acquisition process (?)	Not possible	Company is negotiating a 49-year lease contract and resettlement
Current land use	Irrigated export production and smallholders	Grazing land and smallholders
Crops currently grown	Chilli, ginger, French beans, flowers and passion fruits	Mostly grazing but also maize, soya, plantains and beans
Comments	GET IT collaborates with district and cooperatives	Gabiro Agribusiness owns 90% and Netafin (Israeli company) 10%
IRRIGATION/WATER		
Irrigation scheme	Surface irrigation (not pressurised)	Pump irrigation and hillside irrigation / on site developed by investor
Status	Completed and operational	Expected in 2021–2022
Water source	Muyanza river / Rain / catchment dam	Akagera River: 7700 (wet)–168,000 (dry) m ³ /second
Sustainability	Low risk of depletion	Low risk of depletion; 1% of dry time water will be used
Price of water	Flat rate for water; 200–300 USD per year + 5 wages employees	0.18 USD/m ³ (estimation)
Number of pumps	Taps on irrigated lands; tap point / 50 m tap; 80 hose drills	23 pumping stations
Length of irrigation canal	42 km canal system + 26 km pipe system	27–30 km (4 meters width)
Pumping capacity	No pumps	5.5 mm per ha/day (available)
Power source	No electricity	National grid
Electricity costs per month (RWF)	No electricity	?
Reservoir capacity	2.3 million m ³ dam	120,000 m ³ and 210,000 m ³ reservoirs for 8 hours
Current use of irrigation	22% of water is being used (GET IT and Nature Fresh)	No irrigation; only two dams for dairy farmers which will be removed
Water situation wet season	Combine rain catchment and irrigation	Combine rain catchment and irrigation
Water situation dry season	Reservoir is never below 40% capacity	Desert/dry area during the dry season
Funding	World Bank	Government
Comments		Dry season is 2–3 weeks shorter but dry season is a bit more dry
LOGISTICS		
Cooling facilities	Five cold chain facilities each with a capacity of 30 m ³	None
Distance Kigali Airport	2 hours	3.5 hours
Distance to paved road	45 minutes	1 hour
Comments	Only 200 of 1150 is currently being utilised	Concrete road will be developed by government in 1.5 years time Investor pays: water fee (usage), on site irrigation and lease fee

Field site name	NGOMA	RWAMAGANA
GEOGRAPHY/CLIMATE		
Province / location	East	East
District	Ngoma	Rwamagana
GPS point (latitude)	-2° 05' 40"	-1° 59' 55"
GPS point (longitude)	30° 30' 53"	30° 20' 55"
Land available (ha)	300	215
Flat land available (ha)	130 marshland	80 marshland
Max temperature (day) ±0.5	26.5 –28.5	25.3–27
Min temperature (night) ±0.5	13.8 –15.5	11.7–13.6
Rainfall range (mm/month) (peaks)	0–120 mm (peaks up to 300 mm)	0–120 mm (peaks up to 300 mm)
Rainfall (mm/year) (min-max)	820 mm (590–1100)	830 mm (620–1100)
Altitude (m)	1380	1388
Soil type	Clay / clay loam	Clay
OWNERSHIP/USE		
Current land owner	Private individuals	Approximately 52 ha is state-owned
Land acquisition possibilities	Buying or leasing (?)	Buying or leasing (?)
Current land management	RAB and District of Ngoma	MinAgri
Land acquisition process (?)	Land can be bought from private individuals	Land can be bought from individuals/government
Current land use	Smallholders leasing the land from owners	Smallholder farmers
Crops currently grown	Maize, tree tomato, vegetables, beans and rice (marshland)	Maize, beans, vegetables and chili (export)
Comments	Food security project ongoing	Farmers pay 100 RWF per are per season to MinAgri
IRRIGATION/WATER		
Irrigation scheme	Pump reservoir and hillside irrigation: surface /pressurized	Surface irrigation (not pressurised)
Status	Completed and operational	Completed but ongoing expansion of irrigation scheme
Water source	Rain / catchment dam	Stream (mostly) / rain: catchment dam
Sustainability	Competition for water is likely	Competition for water is likely
Price of water	Water permit (estimation: 200–300 euros)	Water permit (estimation: 200–300 euros)
Number of pumps	5 pumps	No pumps
Length of irrigation canal	5 km (3 hours for water to reach the end)	15 km with reservoir at the end
Pumping capacity	12 m ³ /hour	No pumping
Power source	Solar and national grid	No electricity
Electricity costs per month (RWF)	0–300,000 (depending on sun)	No electricity
Reservoir capacity	600,000 m ³ dam	1,000,000 m ³ dam
Current use of irrigation	Smallholder farmers use irrigation 5 hours per day	Smallholder farmers use 4–6 hours per day
Water situation wet season	Irrigation is not/barely used by smallholder farmers	Smallholders use when necessary
Water situation dry season	Season C there is very little water in the reservoir	12 m height reservoir drops 3 m in dry season (600 m ³)
Funding	Japan (12 million USD)	World Bank
Comments	Longer dry season!; season C little water in the reservoir	Dry season is 2–3 weeks shorter
LOGISTICS		
Cooling facilities	None	35 tonnes cooling room
Distance Kigali Airport	2 hours	1 hour
Distance to paved road	30 minutes	20 minutes
Comments	Road connection is good (also unpaved road)	Feeder road to site is in good condition

REFERENCES

- ¹ <https://www.globenewswire.com/news-release/2019/03/27/1773920/0/en/Global-Seasonings-And-Spices-Market-Size-Will-Grow-USD-20-99-Billion-By-2024-Zion-Market-Research.html>
- ² <https://www.globenewswire.com/news-release/2019/03/27/1773920/0/en/Global-Seasonings-And-Spices-Market-Size-Will-Grow-USD-20-99-Billion-By-2024-Zion-Market-Research.html>
- ³ <https://www.globenewswire.com/news-release/2015/05/22/738509/10135710/en/Seasonings-and-Spices-Market-Will-Reach-USD-16-6-Billion-Globally-by-2019-Transparency-Market-Research.html>
- ⁴ <http://www.intracen.org/news/These-are-the-worlds-three-most-traded-spices/>
- ⁵ <https://www.cbi.eu/news/growing-interest-spices-africa-middle-east-europe/>
- ⁶ <https://www.cbi.eu/news/growing-interest-spices-africa-middle-east-europe/>
- ⁷ <https://www.cbi.eu/news/growing-interest-spices-africa-middle-east-europe/>
- ⁸ <https://www.cbi.eu/news/growing-interest-spices-africa-middle-east-europe/>
- ⁹ Food and Agriculture Organization (2020) <http://www.fao.org/faostat/en/#data>
- ¹⁰ Food and Agriculture Organization (2020) <http://www.fao.org/faostat/en/#data>
- ¹¹ <https://www.marketresearchfuture.com/reports/spices-market-1644>
- ¹² <https://www.cbi.eu/market-information/spices-herbs/trends/>
- ¹³ <https://www.healthline.com/nutrition/10-healthy-herbs-and-spices#section9>
- ¹⁴ <https://www.cbi.eu/market-information/spices-herbs/trends/>
- ¹⁵ <https://www.marketresearchfuture.com/reports/spices-market-1644>
- ¹⁶ <https://www.cbi.eu/market-information/spices-herbs/trends/>
- ¹⁷ <https://www.alliedmarketresearch.com/organic-spice-market#:~:text=Organic%20Spices%20Market%20Outlook%20%2D%202026,US%2480%20billion%20by%202020.>
- ¹⁸ <https://www.marketresearchfuture.com/reports/spices-market-1644>
- ¹⁹ <https://orgprints.org/5161/3/parrot-et-al-2006-africa.pdf>
- ²⁰ <https://www.ecowatch.com/africa-organic-farming-2645140987.html?rebellitem=5#rebellitem5>
- ²¹ IDH (2020) <https://www.idhsustainabletrade.com/initiative/sustainable-spices-initiative/>
- ²² World Bank (2018) <https://data.worldbank.org/indicator/EN.POP.DNST?locations=RW-NL>
- ²³ <https://www.newtimes.co.rw/section/read/222271>
- ²⁴ Rwanda Development Board (2020) <http://rdb.rw/export/export/products-directory/horticulture-sector/>
- ²⁵ Food and Agriculture Organization (2020) <http://www.fao.org/faostat/en/#data>
- ²⁶ Herve Villard Habonimana (2015) https://www.researchgate.net/figure/Elevation-map-of-Rwanda_fig3_303667647
- ²⁷ Ministry of Agriculture and Animal Resources (2015). Annual report 2014/2015. <https://www.smallstarter.com/browse-ideas/how-to-start-a-spice-business-in-africa/>
- ²⁸ <https://www.smallstarter.com/browse-ideas/how-to-start-a-spice-business-in-africa/>
- ²⁹ <https://www.government.nl/binaries/government/documents/publications/2019/02/05/climate-change-profiles/Rwanda.pdf>
- ³⁰ Meteo Rwanda (2020) <https://meteorwanda.gov.rw/index.php?id=30>
- ³¹ Wageningen University and Research (2016). Horticulture and floriculture in Rwanda: Identification of focus areas for sector development. <https://www.theigc.org/wp-content/uploads/2018/08/Rwanda-38313.pdf>
- ³² <https://www.theigc.org/wp-content/uploads/2018/08/Rwanda-38313.pdf>
- ³³ Ministry of Agriculture and Animal Resources (2010). Rwanda Irrigation Master Plan.
- ³⁴ Global Solar Atlas (2020) <https://globalsolaratlas.info/download?c=-1.946952,29.880066,9>
- ³⁵ https://www.researchgate.net/publication/266675970_GIS-Based_Multi-Criteria_Analysis_for_Arabica_Coffee_Expansion_in_Rwanda
- ³⁶ <https://popups.uliege.be/1780-4507/index.php?id=16828&file=1&pid=10902>
- ³⁷ http://www.fao.org/fileadmin/user_upload/GSP/docs/elmina/Rwanda_Priorities.pdf https://esdac.jrc.ec.europa.eu/Library/Maps/Africa_Atlas/Documents/JRC_africa_soil_atlas_part1.pdf
- ³⁸ https://www.researchgate.net/publication/266675970_GIS-Based_Multi-Criteria_Analysis_for_Arabica_Coffee_Expansion_in_Rwanda
- ³⁹ https://www.afdb.org/fileadmin/uploads/afdb/Documents/Project-and-Operations/Rwanda_-_Transport_Sector_Review_and_Action_Plan.pdf
- ⁴⁰ https://unctad.org/en/Docs/iteipc200611ch3_en.pdf
- ⁴¹ <https://www.logupdateafrica.com/setting-sight-to-become-africas-logistics-hub>
- ⁴² Logistic Update Africa (2019) <https://www.logupdateafrica.com/rwanda-to-launch-phase-i-of-east-africas-first-ever-inland-port-shipping>
- ⁴³ Rwanda Development Board (2019). Horticulture: the Rwandan Opportunity (presentation).
- ⁴⁴ National Agricultural Export Board & Rwanda Development Board (2016). Opportunities for Investors in Rwanda's Horticulture Sector.
- ⁴⁵ Rwanda Development Board (2019). Horticulture: The Rwanda Opportunity.
- ⁴⁶ <https://www.doingbusiness.org/content/dam/doingBusiness/country/r/rwanda/RWA.pdf>
- ⁴⁷ https://santandertrade.com/en/portal/establish-overseas/rwanda/investing?actualiser_id_banque=oui&id_banque=44
- ⁴⁸ https://www.nordeatrade.com/en/explore-new-market/rwanda/investment?vider_sticky=oui
- ⁴⁹ https://unctad.org/en/Docs/iteipc200611ch3_en.pdf
- ⁵⁰ <https://resiliencebv.com/publications/report-investing-in-rwanda-the-dutch-experience/>
- ⁵¹ Rwanda Development Board (2020) <http://rdb.rw/export/export/products-directory/horticulture-sector/>
- ⁵² <https://www.agroberichtenbuitenland.nl/landeninformatie/rwanda/documenten/publicaties/2018/11/27/importing-plant-into-rwanda>
- ⁵³ SITA (2020) Interview by TRAIDE team; GET IT (2020). Interview by TRAIDE team.
- ⁵⁴ Rwanda Development Board and National Agricultural Export Board (2017). Investor Information Pack: Opportunities for Floriculture Investment in Rwanda.
- ⁵⁵ National Institute of Statistics of Rwanda (2019). Labour Force Survey Trends.
- ⁵⁶ Food and Agriculture Organization (2020) <http://www.fao.org/in-action/rural-livelihoods-dataset-rulis/data/by-country/en/>
- ⁵⁷ <http://www.voicesofsita.com/2018/02/26/east-african-spices-on-show-at-international-spices-conference/>
- ⁵⁸ United Nations Rwanda (2019) <https://rwanda.un.org/en/9128-itc-ups-ante-here-rwanda-sita>
- ⁵⁹ SITA (2020). Interview by TRAIDE team.
- ⁶⁰ <http://www.indianspices.com/spice-catalog/pepper-1.html>
- ⁶¹ https://www.researchgate.net/publication/272796032_Spices_in_Coffee-Based_Farming_Systems_of_Southwestern_Ethiopia
- ⁶² https://www.indiaagronet.com/horticulture/CONTENTS/black_pepper.htm

- ⁶³ <https://www.transparencymarketresearch.com/black-pepper-market.html#:~:text=The%20global%20black%20pepper%20market,in%20developing%20countries%2C%20especially%20China.>
- ⁶⁴ Herms S. (2015). Business Opportunities Report Spices #6 in the series written for the “Ethiopian Netherlands business event 5–6 November 2015, Rijswijk, The Netherlands”.
- ⁶⁵ http://gnot-katzers-spice-pages.com/engl/Amom_sub.html
- ⁶⁶ <https://www.indiaagronet.com/indiaagronet/crop%20info/Cardamom.htm>
- ⁶⁷ <https://www.indiaagronet.com/indiaagronet/crop%20info/Cardamom.htm>
- ⁶⁸ <https://www.indianspices.com/spice-catalog/cardamom-large.html>
- ⁶⁹ https://www.researchgate.net/publication/280131535_Shade_trees_and_its_importance_in_cardamom_plantations
- ⁷⁰ <https://www.cbi.eu/market-information/spices-herbs/cardamom>
- ⁷¹ <https://www.tridge.com/intelligences/cardamom/TZ/production>
- ⁷² <https://www.cbi.eu/market-information/spices-herbs/cardamom>
- ⁷³ Chatterjee et al., (2012). *Quality Bird’s Eye Chili Production: A Retrospective*. Available at: http://www.pphouse.org/upload_article/23_IJBSM_Sept_2012_Chatterjee.pdf
- ⁷⁴ SITA (2020). Interview by TRAIDE team.
- ⁷⁵ International Trade Centre (2020). Trademap.
- ⁷⁶ <https://gashorafarm.com/about-us/>
- ⁷⁷ Green Harvest; ABCD GREAT LIFE Ltd; AN Hinga Ltd; BAhage Food Ltd; CF PREMIUM Company; Crinnod Ltd; Diversity Ventures; Effective M and N Limited; Excella Produce Ltd; Fluveg; Gashora Farm; KAB Fresh; PEBC; SOUK Investment; Sun Fresh Ltd; Team Africa Ltd; TRANSCOM Ltd; Veggie Fresh; Virunga Biotech Ltd.
- ⁷⁸ <https://gashorafarm.com/about-us/>
- ⁷⁹ https://www.agrilinks.org/sites/default/files/2018_rwanda_investment_opportunity_identification-c.pdf
- ⁸⁰ http://www.organicconsultants.org/organic_consultants_publications.php
- ⁸¹ <https://www.magzter.com/article/Business/Farmers-Weekly/Ginger-a-challenging-crop-but-well-worth-the-effort>
- ⁸² http://www.organicconsultants.org/organic_consultants_publications.php
- ⁸³ <https://www.newtimes.co.rw/section/read/187601>
- ⁸⁴ Interview SITA (2020).
- ⁸⁵ <http://www.intracen.org/news/Jacques-Seneza-Piloting-ginger-production-in-Rwanda/>
- ⁸⁶ Herms S. (2015). Business Opportunities Report Spices #6 in the series written for the “Ethiopian Netherlands business event 5–6 November 2015, Rijswijk, The Netherlands.”
- ⁸⁷ <https://www.agric.wa.gov.au/capsicums-and-chillies/growing-capsicums-and-chillies>
- ⁸⁸ <https://www.cabi.org/isc/datasheet/15784#tohabitat>
- ⁸⁹ <https://journals.ashs.org/horttech/view/journals/horttech/20/3/article-p530.xml>
- ⁹⁰ Herms S. (2015). Business Opportunities Report Spices #6 in the series written for the “Ethiopian Netherlands business event 5–6 November 2015, Rijswijk, The Netherlands.
- ⁹¹ <https://www.almanac.com/plant/rosemary>
- ⁹² <https://wikifarmer.com/rosemary-growing-conditions/>
- ⁹³ <https://www.nda.agric.za/docs/Brochures/ProGuiRosemary.pdf>
- ⁹⁴ SITA (2020). Interview by TRAIDE team.
- ⁹⁵ <https://www.futuremarketinsights.com/reports/rosemary-extracts-market>
- ⁹⁶ <http://www.indianspices.com/spice-catalog/vanilla.html>
- ⁹⁷ <http://theepicentre.com/spice/vanilla/>
- ⁹⁸ <http://www.indianspices.com/spice-catalog/vanilla.html>
- ⁹⁹ <http://theepicentre.com/spice/vanilla/>
- ¹⁰⁰ <https://www.trademap.org/Index.aspx>
- ¹⁰¹ <https://allafrica.com/stories/201602081169.html>



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