



LOCAL ENTERPRISE AUTHORITY

# MARKET OPPORTUNITIES FOR RESTRICTED HORTICULTURE CROPS IN BOTSWANA



INFORMATION AND KNOWLEDGE MANAGEMENT DIVISION

FEBRUARY 2022



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## EXECUTIVE SUMMARY

The Government of Botswana, through the Ministry of Agricultural Development and Food Security (MOADFS) issued a press release on the 03<sup>rd</sup> December 2021 on the long-term (2 years) restriction of imports of 16 selected vegetable crops. The 16 vegetables restricted from importation include tomatoes, carrots, beetroots, potatoes, cabbage, lettuce, garlic, onions, ginger, turmeric, chilli peppers, butternut, watermelons, sweet peppers, green mealies, and fresh herbs. The restriction took effect from the 1<sup>st</sup> January 2022 and will be reviewed every 2 years.

Local production has continued to improve from 37,000tonnes in 2018/19 steadily increasing to about 40,000tonnes in 2020/21. In values terms, locally produced vegetables increased from P125M in 2018/19 to P188M in 2020/21.

Imports, on the other hand, have also continued to increase year-on-year since 2017, at 27,000 tonnes for 3 consecutive years from 2017-2019, and, in value terms increasing from P139M in 2017 to P162M both in 2018 and 2019. Imports continued to increase in 2020 to about 34,000tonnes valued P197M. During the 9-months period of 2021, imports amounted to 33,000 tonnes, valued P194M. Exports remain insignificant, at values of less than P300K annually and less than 25tonnes, on average.

To substitute vegetables imported in 2020, it is estimated that the size of land required will amount to 902ha, assuming no harvest loss. Considering farm losses of about 30%, 1289ha of land will be needed to produce 2020 imports quantities. In addition, there are 5 major areas along Shashe River, Molopo-Limpopo Rivers and Boteti Rivers identified as major Horticulture Agro-Ecological Zones. The other 3 regions (Kweneng, Boteti & Northeast) have already designed and implemented National Cropping Plans.

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Evidently, imports (54%) slightly outweigh local production (46%), and there is need to more than double production to meet local demand during the period of imports restriction. On a positive note, 10 of 16 restricted products have quality grading standards developed by Botswana Bureau of Standards (BOBS). These are expected to facilitate formal market access by compensating the farmers according to the quality standards perceived by the market. Rewards for quality are expected to drive farmers towards production under the protected environments with even higher quality and yields compared to open field production methods. The recommendations made in this study are to facilitate increased production and achievement of self sufficiency in these crops in the short to medium term.

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## 1 INTRODUCTION

The Government of Botswana, through the Ministry of Agricultural Development and Food Security (MOADFS) issued a press release on the 03<sup>rd</sup> December 2021 about the long-term (2 years) restriction of imports of 16 selected vegetable crops. The restriction was facilitated by several acts and policies geared towards citizen economic empowerment and achieving prosperity for all, as enshrined in Pillar 1 of the Botswana Vision 2036. These include the enactment of the Citizen Economic Inclusion Act and the Public Procurement Act in 2021, followed by the reviewed Horticulture Impact Accelerator Subsidy (IAS) recently launched by the MOADFS.

The vegetables restricted from importation include tomatoes, carrots, beetroots, potatoes, cabbage, lettuce, garlic, onions, ginger, turmeric, chilli peppers, butternut, watermelons, sweet peppers, green mealies, and fresh herbs. The restriction took effect from the 01<sup>st</sup> January 2022 and will be reviewed every 2 years.

## 2 OBJECTIVE

The main objective of the report is to assess the consumption/demand of the restricted crops with a view to identify the size of the opportunity presented by the restriction of imports. The information is useful to give guide to new and existing farmers on the size of the market which needs to be met by increasing production of the restricted crops.

## 3 METHODOLOGY

The report used secondary data to compile local production data from the Ministry of Agricultural Development and Food Security, trade data from Statistics Botswana and quality standards from Botswana Bureau of Standards (BOBS). The quantitative data was analyzed through excel.

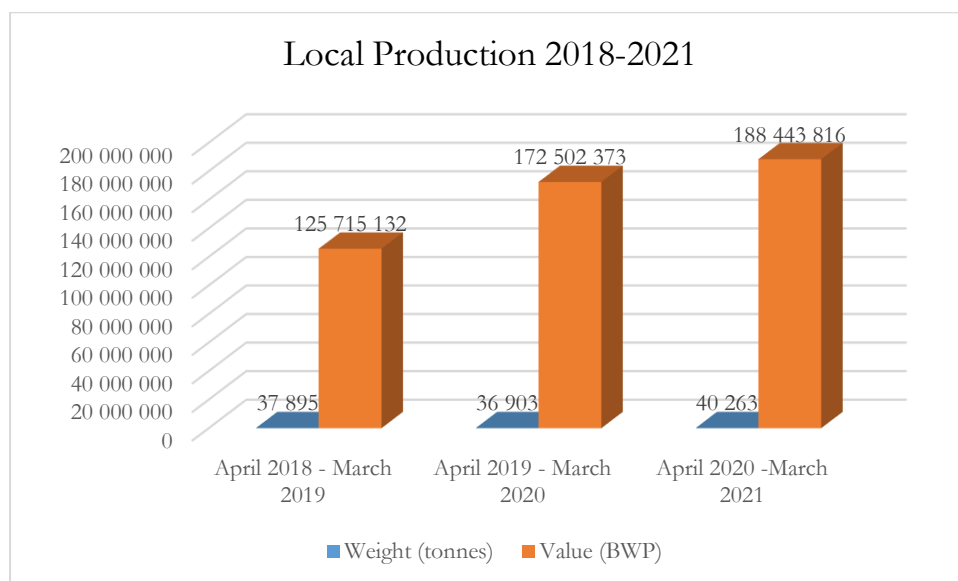
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## 4 FINDINGS

### 4.1 The Size of the Market

The size of the market consists of local production, imports, and exports. According to the Department of Agribusiness Promotion (MOADFS), local production has continued to improve from 37,000tonnes in 2018/19 steadily increasing to about 40,000tonnes in 2020/21. In values terms, locally produced vegetables increased from P125M in 2018/19 to P188M in 2020/21. Figure 1 refers. Data shows that there is no production of ginger and turmeric locally.

**Figure 1: Local Production of Restricted Vegetables 2018-21**



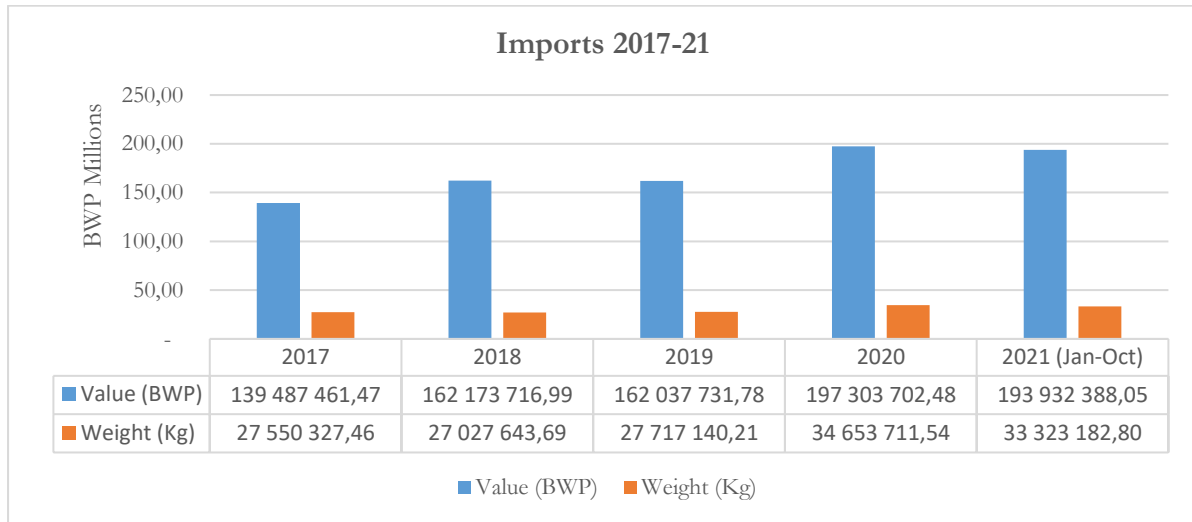
Source: Author's generated from MOADFS (2018/19, 2019/20, 2020/21)

Imports, on the other hand, have also continued to increase year-on-year since 2017, Annex 1 refers. Figure 2 shows that Botswana imported about 27,000 tonnes for 3 consecutive years from 2017-2019, and, in value terms increasing from P139M in 2017 to P162M both in 2018 and 2019. Imports continued to increase in 2020 to about 34,000tonnes at a value of P197M and were at 33,000 tonnes, valued P194M

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for the 9-months period of 2021. This increase of imports became more significant from 2020 during the commencement of the COVID-19 and resultant lockdowns.

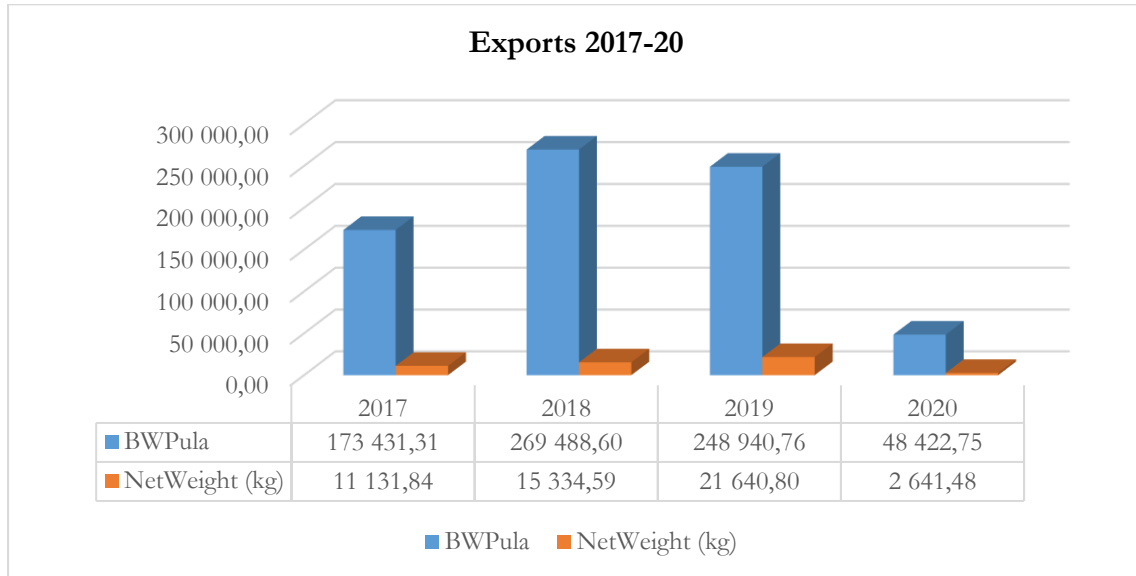
**Figure 2: Imports of Restricted Vegetables 2017-2021**



Sources: Author's generated from Statistics Botswana (2017-21) data

Exports remain very insignificant as shown in Figure 3; ranging from 11 tonnes in 2017 (valued about P173 000) to 21 tonnes, at a value of about P240 000 in 2019. The exports decreased dramatically to about 2 tonnes in 2020, at a value of about P48 000. This might have resulted from the economic relief packages (in the form of food parcels) at the beginning of the lockdown in 2020, which was meant to relief vulnerable families from the negative impact of COVID-19. Government procured vegetables from local producers for distribution to vulnerable families through the relief program. Therefore, with the foregoing picture depicted by the local market, to satisfy the local demand for the restricted vegetables, local production needs to increase by more than 34,000 tonnes.

**Figure 3: Local Exports of Restricted Vegetables 2017-20**



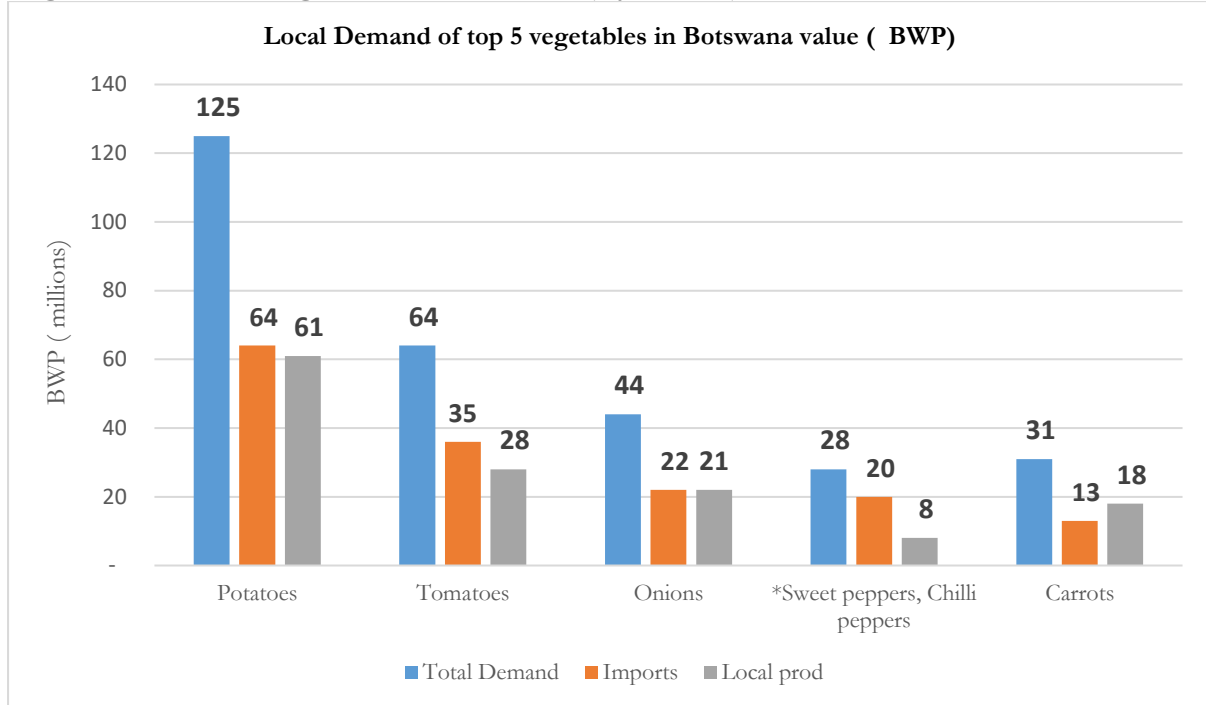
Source: Author's generated from SB (2017-20)

#### 4.2 Top 5 Vegetables Demand (by Value)

The top 5 vegetables in higher demand in Botswana are potatoes, tomatoes, onions, Peppers and carrots. The total demand of these 5 vegetables stood at P293 million, with imports accounting for P155 million and local production at P136 million in 2020. More than half of the demand these vegetables were met by imports with the highest being potatoes and carrots being the least imported among the 5 crops. Figure 4 refers.



**Figure 4: Top 5 Vegetables Demand (by Value)**



Sources: Author generated from MOADFS (2021) & Statistics Botswana (2022) data

### 4.3 Land Size (Ha) Requirements to Substitute Imports

To substitute the imports, it is estimated that the size of land required, to produce about 34 000tonnes of vegetables or even more, will amount to 902ha assuming no harvest loss. Considering farm losses of about 30%, 1289ha of land will be needed to produce and replace the same number of imports of 2020. Annex 2 refers.


In conclusion, on the market size, the local market is still generally dominated by imports, contributing 54% while local production stands at 46% in satisfying the local demand. This finding presents an opportunity for local producers to increase local production by more than 34 000tonnes of the restricted vegetables. This would require approximately 1289ha of land to produce the required number of vegetables to substitute imports. A further increase in production would support the agro-processing industry and an increase in exports, which are currently negligible.

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#### **4.4 The Outlook of Agro – Ecological Zones**

There are 5 major areas along Shashe River, Molopo-Limpopo Rivers and Boteti Rivers identified as major Horticulture Agro-Ecological Zones. Outside these ecological zones, there is also horticulture production that takes place. The 3 regions which have already designed and implemented National Cropping Plans are Kweneng, Boteti & Northeast. Figure 5 refers.



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#### 4.5 Local Production Techniques of Restricted Horticulture Crops

Table 1 shows the profiles of some of the restricted vegetables in terms of ideal climatic conditions for growth in Botswana, common pests and diseases and expected harvests. The cool season crops include cabbage and lettuce. Vegetables which perform better under cool-warm conditions are potatoes, onions, carrots, green mealies, ginger, and garlic. Others like tomatoes, beetroots, butternuts, peppers, watermelons, and turmeric thrive in warmer conditions. It is important to note that most (10) of the restricted vegetables have quality standards from Botswana Bureau of Standards (BOBS) except for ginger, garlic, turmeric and fresh herbs.

**Table 1: Production Techniques of Restricted Horticulture Crops in Botswana**

CROP	Common Cultivars	Pests	Diseases	Climatic Conditions	Fertiliser Requirement	Maturity (days/weeks)	Irrigation (how often during planting & Growth)	Expected Yield (t/ha)		BOBS Quality Standards (Specifications & Grading Requirements)
								Open Field	Protected Environment	
Potatoes	Mondial, Sifra, Avalanche, Valor, Fianna , Up To Date (UTD) , BP1, Lanorma, Almera, Markies, Fabula, Innovator, Hertha	Potato tuber moth, Aphids, nematodes, green spider mite	Common scab, Early blight, late blight, leaf mottling, mosaic virus	Warm season crop preferring a cool - warm temperatures. A mean optimum temperature for tuber formation lies between 15 - 20°C. The crop is susceptible to frost. Above 32°C tuber formation and development is very poor. Under local conditions, potatoes can be planted from July - February.	General nutrient recommendation is as follows. Base Dressing: 63 Kg/ha N, 94 kg/ha P and 63 kg/ha K. e.g. A single application of 1000kg/ha 2:3:2(22) will provide these quantities. Top Dressing: 106 Kg/ha N, applied at about 4 weeks after emergence, to coincide with the first ridging. If a soil analysis report is available these rates should be modified accordingly. Potatoes are heavy feeders and inadequate fertilization will result in poor yields.	4 months to reach maturity but early maturing cultivars (3.5 months) are available.	Maintain adequate moisture in the top 60 cm of soil, which is the normal rooting depth for potatoes. Irrigate 2 x weekly, which should amount to 30 – 40 mm/day. Total seasonal water requirement ranges from 400 – 800 mm. Irrigation should be gradually reduced towards the end of the season when the leaves become yellow and starts dying.	45	N/A	BOS 59: 2011

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Tomatoes	„Rodade, Heinz 1370, Star 9008, Star 9009, Star 9011, Star 9036, Sundance, Zeal, Zest, Disco, Money Maker, Settler, Domino, Tangeru	Tomato leaf miner (Tuta absoluta), Red spider mite, Cut worm, American ball worm, Root knot nematodes	Early blight, Fusarium wilt, Late blight, Septoria leaf spot, Verticillium wilt, Powdery mildew, Tomato spot, Cucumber mosaic virus, Bacterial canker, Bacterial spot	summer crop sensitive to frost. Optimum temperature is 28°C with minimum temperatures of 10°C Maximum temperature of 34°C Temperature fluctuation affects the resultant yields of the crop.	0 –5 weeks: vegetative growth occurs with high nitrogen requirements.6 – 12 weeks: the flowering stage with high potassium requirements.12 –20 weeks: the fruit set and fill stage with high calcium, magnesium requirements Ideal fertilization levels: N: 180 –200 kg/ha P: 60 –100 kg/ha K: 300 –400 kg/ha Ca: 250 –300 kg/ha Mg: 50 –60 kg/ha	12-20 weeks	Plant requires 0.3 litres of water/day for the first four weeks thereafter2-3 liters water/day from 8 weeks till end of harvest	60 - 80	80-200	BOS 4: 2012 2nd ed.
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Onions	Granex 2000, Texas Grano 502 PRR, Australian Brown, GlobeTexas grano, Granex	Thrips	Downy Mildew, pink rot, black mould	Ideal temperature for growth ranges from 22 – 28 °C. High temperatures or other stressful conditions cause them to “bolt”.	N – 180 Kg/ha. 60 Kg/ha pre-plant, 60Kg at 2 leaf stage 60Kg at 4 weeks. • P – 100Kg/ha. All applied pre-plant. • K – 170 Kg/ha. 110Kg/ha pre-plant, 60Kg/ha 7-8 weeks prior to harvest. • A soil analysis is required for formulation of a detailed programme	Harvesting in 24 – 34 weeks	Onions require approximately 400 — 600mm of water during the growing season. Soil should always be kept moist up to a depth of 30cm. Do not water onions for the three weeks before harvesting.	40-60	N/A	BOS 43: 2011 2nd ed.
Beetroots	Crimson Globe, Detroit Dark Red, Star 1105, Globe Dark Red, Early Wonder	Aphids	Cercospora leaf spot, Downy mildew, scab, root rot	Optimum growing temperature is within a range of 12 - 19°C with a maximum of 35°C.	110 kg - 200 kg N/ha with 50% of this applied as basal dressing and the remainder as top-dressing at 10, 20, 30 and 40 days after sowing. P at 50 - 100kg P/ha while 150kg K/ha is recommended applied over an 8-week period	75 - 120 days depending on cultivar and season/temperature	In general, a season total of 300-350 mm with a daily amount of about 4mm is required	30	N/A	BOS 531: 2012
Butternuts	Waltham, Titan F1, Quantum F1, Barbara, Pluto, Atlas, Apollo	Fruit fly, pumpkin fly	Powdery Mildew, Lettuce Mosaic Virus, white mold.	Cucurbits are warm season crops and grow best at temperatures of 23°C to 29°C by day and 15°C to 21°C at night.	Approximately 1000 kg/ha (100g/m <sup>2</sup> ) of a fertilizer mixture such as 2:3:4 (27) must be applied and worked into the soil very slightly just before planting. Apply a top dressing 3 weeks after transplanting or emergence. Use 120-150 kg/ha or 10 g LAN fertilizer per meter of row, applied 10cm from the stem. A second top dressing can be applied 5 weeks later.	90 - 110 days	Keep the soil moist throughout the growing season.	30	N/A	BOS 471: 2012

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Carrots	Chantenay, Nantes, Denvas	Aphids and Red Spider mites but these hardly cause a significant impact	Alternaria blight, Bacterial blight	The optimum temperature for growth is between 15 to 20 °C. Temperatures below 10°C cause longer, more slender and paler roots. Shorter, thicker roots are produced at higher temperatures.	As a general guide, 100 kg/ha fertiliser mixture of 2:3:4 (24) is required as basal dressing and LAN a rate of 100 to 200 kg/ha as topdressing approximately 8 weeks after planting.	60 - 90 days	Soil moisture must be maintained at above 50 % of available moisture throughout growth. Approximately 25 mm - 50 mm per week is required depending on temperature.	30	N/A	BOS 430: 2012
*Sweet peppers, Chilli peppers	Carlifonia wonder, Star 6653, Star 6657, King Aurther, Jupita	Aphids, thrips, mites	Bacterial leaf spot, Phytophthora leaf blight, Damping-off,	It is very vulnerable to frost and grows poorly at temperatures between 5 and 15 °C (Bosland & Votava, 1999). The optimum temperature range for sweet pepper growth is 20 to 25 °C	The recommended nutrient requirement is as follows 1,5 - 3.5 kg N, 0,2 - 0,4 kg P and 2 - 4 kg K per square meter per season.	Most sweet peppers mature in 60 to 90 days after planting; hot peppers can take up to 150 days	Sweet pepper has a total water requirement of about 600 mm and a weekly water requirement of 25 mm during the first five weeks and 35 mm thereafter	25 - 30	50	BOS 272: 2019



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Cabbage	Star 3301, Star 3311, Sapphire, Greenstar, Big cropper, Drumhead	Aphids, Diamond Back Moth, Bagrada bug	Downy mildew, Black rot, black leg, club rot	Prefers cool weather but is adaptable a wide range of temperature. Thrives in an optimal temperature range of 15 — 20°C. Higher temperatures and moisture experienced in summer can lead to higher incidence of diseases	The following is a general recommendation: <ul style="list-style-type: none"> <li>• Basal dressing Apply 2:3:4 (27) at 600 — 900kg/ha or 60 — 90g per m2.</li> </ul> Consider this as the minimum needed to ensure plants get a good start. About 1 200kg of 2:3:4 (27) per ha (120g/m2) is, however, optimal. <ul style="list-style-type: none"> <li>• Top dressing - the plants respond well to an additional top dressing of nitrogen LAN at two, four and six weeks after transplanting. Start with 4g per plant and increase later to 10g per plant. Applying the top dressing late, when the cabbages are already forming heads, can cause splitting and loose heads.</li> </ul>	80 - 120 days depending on cultivar and season	About 35mm per week is optimal	60 - 80	N/A	BOS 58: 2011 2nd ed.
Watermelons	All sweet, Congo, Crimson sweet, Jubilee, Black Diamond	Fruit fly, Aphids	Powdery mildew,	Optimum temperature is 18 – 35°C with temperatures above 35°C or below 10°C resulting in delay of maturity	Same of Butternuts	95 - 120 days	Same as Butternut	30	N/A	BOS 642:2014

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Green mealies	SC 506	Bollworm		A summer crop preferring cool conditions.	N/A	3 -4 months	Keep soil moist up to depth of 60 mm. The crop requires on about 350 - 450 mm of water annually.	N/A	N/A	BOS 765:2018
Lettuce	Avirum, Commander, Frosty, Dual purpose, Del Oro, Del rio, Empire 2000, Frosty Great lakes	Aphids, cutworms, Earwigs, Slugs/snails, white flies, Rabbits	Powdery Mildew, Lettuce Mosaic Virus, white mold.	Lettuce is a cool season crop that grows best within a temperature range 12°C to 20°C.	Fertilizers recommendations should be based on soil Analysis. Over fertilising with nitrogen may result in increased susceptibility of the crop to various diseases or disorders. 2:3:4(30) fertiliser mixture at a rate of 500 to 1000kg/ha basal dressing can be applied depending on soil Fertility. Side dressing of 150 t0 250 kg/ha can be applied at 4 weeks.	6 to 8 weeks	Lettuce has shallow root system, and such requires frequent but lighter irrigations. The roots penetrate the soil to a depth of only 300mm. Water should be applied throughout the growing period and reduced when heads become full. Water shortage tends to promote bolting	20-30	30	BOS 590: 2013

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Ginger	Yellow Ginger and white ginger	Nematodes, Mealy bug, aphids, shoot borer.	Fusarium rot, Bacteria rot, Bacteria wilt, leaf spot.	Plant ginger in early spring to early summer, from late august to October is the best time.	350 and 500kg per hectare of 2:3:4(30) along the plant rows. Repeat same mixture at 10 weeks after planting, again at 16 weeks and to week 24 after planting. Monitor growth and rhizome development throughout growing season. Spay of trace elements are also good to ensure healthy plant growth	8 -9 months	An irrigation Schedule of between 45 to 55 millimeters per week is advised. It is also advisable to install moisture sensors to control moisture content of the soil.	35-50	N/A	N/A
Garlic	Artichoke, Silverskin, Porcelain, Purple stripe, Rocambole	Cutworms, pink stalk borer	Brown rust, white bulb rot, pink rot, Stemphylium leaf blight, neck rot	Garlic thrives well in warm climates but can survive winter temperatures, most of the conditions that are suitable for onion production are also suitable for garlic. Suitable growth temperature for garlic is 13 to 24°C.	Garlic is a heavy feeder. Incorporating the compost in the soils does improve soil structure and soil fertility. At planting about 125g of 3:2:3 can be applied per square meter using the broadcasting Method. A light side dressing of 40g of 3:2:3 can be applied per square meter during growing period., which is 6 to 8 weeks after planting. Also apply nitrogenous fertilizer.	6 to 9 months	Garlic can be successfully grown using furrow, sprinkler, or drip irrigation.it has relatively shallow roots system and it is therefore sensitive to moisture stress throughout the growing season.	15	N/A	N/A

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Turmeric	Palam Pitamber, Palam lalima, Seketi haldi	Shoot borer, Leaf roller, Rhizome scale, Nematodes	Leaf Blotch, Leaf spot, Rhizome rot	Turmeric can be grown in diverse tropical conditions from sea level to 1500m. It requires annual rainfall of 1500mm or higher. However, it can be grown in the dry zone under irrigation. Ideal temperature range is 20-30°C.	2:3:4 (30) 500kg to 1000kg per hectare considering soil tests. Top dress urea 1 month later at 25 kg per ha. Top dress again 3 months later with urea at 25kg per ha	Early varieties 7 to 8 months. Medium varieties 8-9 months	Turmeric needs 6000-6900 m <sup>3</sup> water per hectare and produce a yield up to 13.5 t/ha of dry Turmeric under drip - fertigation assisted precision farming.	15-20	N/A	N/A
Fresh Herbs	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Source: Manual for Vegetable Production in Botswana (2013)

N/A- Not Available

## 5 CONCLUSION

The significant number of imported vegetables presents an opportunity for local producers to more than double their production capacities to meet the national demand and substitute imports (34 000tonnes). The increase will boost local inputs production along the horticulture value chain such as seeds and seedlings production, fertilisers and pesticides, packaging material and machinery. In addition to satisfying local demand, a further stride in increased local production would support the agro-processing industries, and even support increased export quantities which are currently negligible.

After passing the 2 legislations in 2021, Citizen Economic Inclusion Act and the Public Procurement Act, the restriction on vegetable imports is expected to grow the sub-sector rapidly to attain government's priority of developing the agriculture sector and food value chains contained in the Reset Agenda. The restriction is also expected to ease market penetration of local vegetables into the retail market. It is important to note that the yields of some crops such as tomatoes and green pepper increase exponentially under protected environments, and therefore an ideal production method for local farmers. With the foregoing information and the prospects of increased local production and expected ease of market penetration, financial institutions are also expected to eventually warm up to support the horticulture sub-sector. Facilitation of increased production by all key stakeholders in the horticulture sector should achieve self sufficiency in the short to medium term.

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## 6 RECOMMENDATIONS

Based on the findings and opportunities identified, the following are recommended for short and medium-term implementation.

1. There is need to develop and coordinate a nation cropping plan with immediate effect to ensure consistent supply of horticulture production in Botswana.
2. LEA should facilitate local production of seedlings for the restricted priority crops to ensure local access to quality seedlings in the short term.
3. LEA to promote and support expansion of production within the horticulture agro ecological zones.
4. LEA to identify and facilitate access to productive lands in the horticulture agro ecological zones for potential start up framers and LEA horticulture incubation graduates.
5. LEA to promote production under controlled environment for specified crops through domestication of production technologies for SMMEs adoption.
6. LEA to facilitate establishment of clusters and seek partnerships with existing horticultural market clusters to promote coordinated market access through horticulture market centres.

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1. Department of AgriBusiness Promotion (2021), Local Production & Sales Statistics, Ministry of Agricultural Development & Food Security, Government of Botswana.
2. Ministry of Agriculture (2003), Manual for Vegetable Production in Botswana, Government of Botswana
3. Statistics Botswana (2022), Trade Data, Statistics Botswana, Government of Botswana.
4. Botswana Bureau of Standards (2022), Standards Catalogue, Botswana Bureau of Standards.

## Annex 1: Trade Data (2017-21)

CROP	2017		2018		2019		2020		2021	
	Annual		Annual		Annual		Annual		(Jan-Oct)	
	IMPORT		IMPORT		IMPORT		IMPORT		IMPORTS	
	BWPula	NetWeight(kg)	BWPula	NetWeight(kg)	BWPula	NetWeight(kg)	BWPula	NetWeight(kg)	BWPula	NetWeight(kg)
Potatoes	46 257 236,81	11 596 006,69	60 332 930,48	12 874 190,13	51 810 801,45	11 638 894,32	64 027 213,08	15 035 047,80	52 409 938,01	14 376 342,33
Tomatoes	29 916 344,38	6 251 007,22	36 539 454,80	5 547 876,09	27 510 822,35	3 766 898,89	35 965 451,39	5 950 536,94	31 950 025,79	4 210 609,96
Onions	20 627 864,47	5 213 920,20	23 129 987,77	4 049 308,16	19 633 311,50	4 407 894,57	22 003 727,66	4 723 479,77	22 563 264,03	5 420 382,03
Beetroots	4 977 759,64	697 879,48	3 353 196,98	702 483,40	2 648 155,10	374 085,04	4 081 262,50	490 087,42	6 141 731,73	933 142,56
Butternuts	3 868 145,71	676 746,71	5 179 505,85	942 999,60	8 372 150,25	2 042 295,51	9 990 155,05	2 078 449,35	10 779 992,26	2 418 514,60
Carrots	8 877 758,18	1 293 015,42	4 808 005,83	738 578,92	9 491 703,97	1 622 181,19	12 947 448,98	2 298 417,41	13 269 531,92	2 279 198,25
*Sweet peppers, Chilli peppers	7 110 967,19	438 040,45	9 449 890,99	533 462,89	17 017 580,77	1 333 291,86	20 018 118,50	1 700 602,22	17 090 724,54	1 480 275,16
Lettuce	6 105 863,16	616 087,19	6 284 188,25	691 295,44	9 103 112,02	888 032,00	8 662 134,58	1 398 944,76	7 289 331,73	774 120,81
Cabbages	277 993,90	18 390,62	49 727,07	28 912,00	173 020,40	44 838,00	88 472,13	36 410,00	98052,93	30522,00
Water melons	2 092 534,70	427 353,91	2 849 009,39	620 473,22	4 248 541,17	1 238 606,02	2 340 365,35	469 296,10	1 721 421,83	372 459,60
Green mealies	13 612,44	3 555,00	20 425,41	904,30	40 940,49	2 478,54	3 995 880,23	220 671,30	4 039 263,00	245 983,82
Fresh Herbs	682 929,94	30 394,84	607 568,74	36 245,11	975 385,04	56 778,02	606 083,82	34 638,40	604 701,85	24 713,24
Ginger	2 614 627,41	96 336,53	3 616 423,81	107 835,68	4 044 682,16	101 624,97	5 558 930,91	132 490,49	12 109 939,11	362 045,05
Garlic	5 442 064,61	173 474,83	5 703 224,95	144 852,94	6 765 898,56	191 688,68	10 633 630,82	290 924,30	13 678 661,46	389 148,99
Tumeric	621 758,95	18 118,37	250 176,69	8 225,83	201 626,54	7 552,60	253 588,94	8 415,35	185 807,85	5 724,40
<b>Total</b>	<b>139 487 461,47</b>	<b>27 550 327,46</b>	<b>162 173 716,99</b>	<b>27 027 643,69</b>	<b>162 037 731,78</b>	<b>27 717 140,21</b>	<b>197 303 702,48</b>	<b>34 653 711,54</b>	<b>193 932 388,05</b>	<b>33 323 182,80</b>

Source: SB (2017-21)



	<b>RESEARCH REPORT TEMPLATE</b>	DOC	RDD.RD.PA02/F03
		EFF	31 <sup>ST</sup> NOV 2014
		REV	01

## Annex 2: Total Estimated Land Required for Substituting Imports

CROP	Import Tonnes (2020)	Tonnes/ha	Ha/ 100% harvest	Ha/90% harvest	Ha/80% harvest	Ha/70% harvest	Ha/60% harvest	Ha/50% harvest
Potatoes	15035	45	334	371	418	477	557	668
Tomatoes	5951	60	99	110	124	142	165	198
Onions	4723	50	94	105	118	135	175	236
*Sweet peppers, Chilli peppers	1701	50	34	38	43	49	57	68
Carrots	2298	25	92	102	115	131	153	184
Beetroots	490	30	16	18	20	23	27	33
Butternuts	2 078	30	69	77	87	99	115	139
Lettuce	1 399	20	70	78	87	100	117	140
Cabbage	36	60	53	59	66	76	89	106
Watermelons	469	30	16	17	20	22	26	31
Ginger	132	35	4	4	5	5	6	8
Garlic	291	15	19	22	24	28	32	39
Turmeric	8	15	1	1	1	1	1	2
Green mealies	6	-	-	-	-	-	-	-
Fresh Herbs	35	-	-	-	-	-	-	-
<b>Total Hectarage</b>	<b>34654</b>		<b>902</b>	<b>1002</b>	<b>1128</b>	<b>1289</b>	<b>1520</b>	<b>1852</b>

Source: Author's estimations