

“The Use of Local Raw Materials for Brewing in Africa”

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Local Raw Materials (LRM)

Commercial Success + Benefitting Communities and Environment



The case for LRM Community Impact

- New employment opportunities for people living in rural areas
 - Small scale farmers migrated into cash-crop farming from subsistence farming
 - Local farmers will be integrated in brewery value chain
 - Mitigation from maize to sorghum in water stressed areas will decrease crop risk
 - Improve local processing and raw material handling capabilities and capacities
 - Create an attractive business opportunity for potential purchasers within the raw material supply and grain handling industry
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The case for LRM Makes Business Sense

- LRM are a cost effective alternative to imported cereals
 - Reduce hedging cost and minimize currency exposure as a result of currency volatility
 - Unlock tax & duty benefits from local Governments for material sourcing within the country
 - Enhance and sustain year-on-year local availability of quality raw material in economically viable volumes.
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The case for LRM

Good for the environment

- Reduction of environmental impact on water stressed areas as some local raw materials such as sorghum are generically adapted to arid and semi-arid conditions, requiring less water compared to 'imported' crops such as maize.
 - Sorghum is a perfect rotation crop for 'low tillage' or 'zero tillage' planting systems, helping to maintain soil quality and moisture to grow e.g. wheat or barley in water-stressed areas.
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Focus on Sorghum and Cassava

Sorghum



Cassava



Currently these two crops hold the brewers' interest

Sorghum

- Sorghum is Africa's second most important cereal.
- Africa produces about 20 million tonnes of sorghum per annum, about one-third of the world crop..
- Sorghum is uniquely adapted to Africa's climate, being both drought resistant and able to withstand periods of water-logging
- Much of the African continent is characterized by semi-arid and sub-tropical climatic conditions.
- Sorghum in Africa is processed into a very wide variety of attractive and nutritious traditional foods, such as semi-leavened bread, couscous, dumplings and fermented and non-fermented porridges.



Sorghum

- It is the grain of choice for brewing traditional African beers.
- Sorghum is also the grain of 21st century Africa. New products such as instant soft porridge and malt extracts are great successes.
- Sorghum has been proven to be the best alternative to barley for clear beer brewing.



Cassava in a nutshell

- Cassava is world's 3rd largest source of carbohydrates
- In Africa it is boiled, roasted or dried into flour for food .
- Contains 25-35% carbohydrates (starch), depending on variety, origin and crop year.
- Contains app 1.2% protein, 1.1% fibre and 0.2% fat
- Contains 62 – 67% water
- Freshly harvested Cassava tubers quickly deteriorate within 24 – 48 hrs
- Tubers are processed into stable intermediate products such as Cassava Chips, flour or Cassava Cake
- Chips and Cake can be further refined into Cassava Starch ('Tapioca')



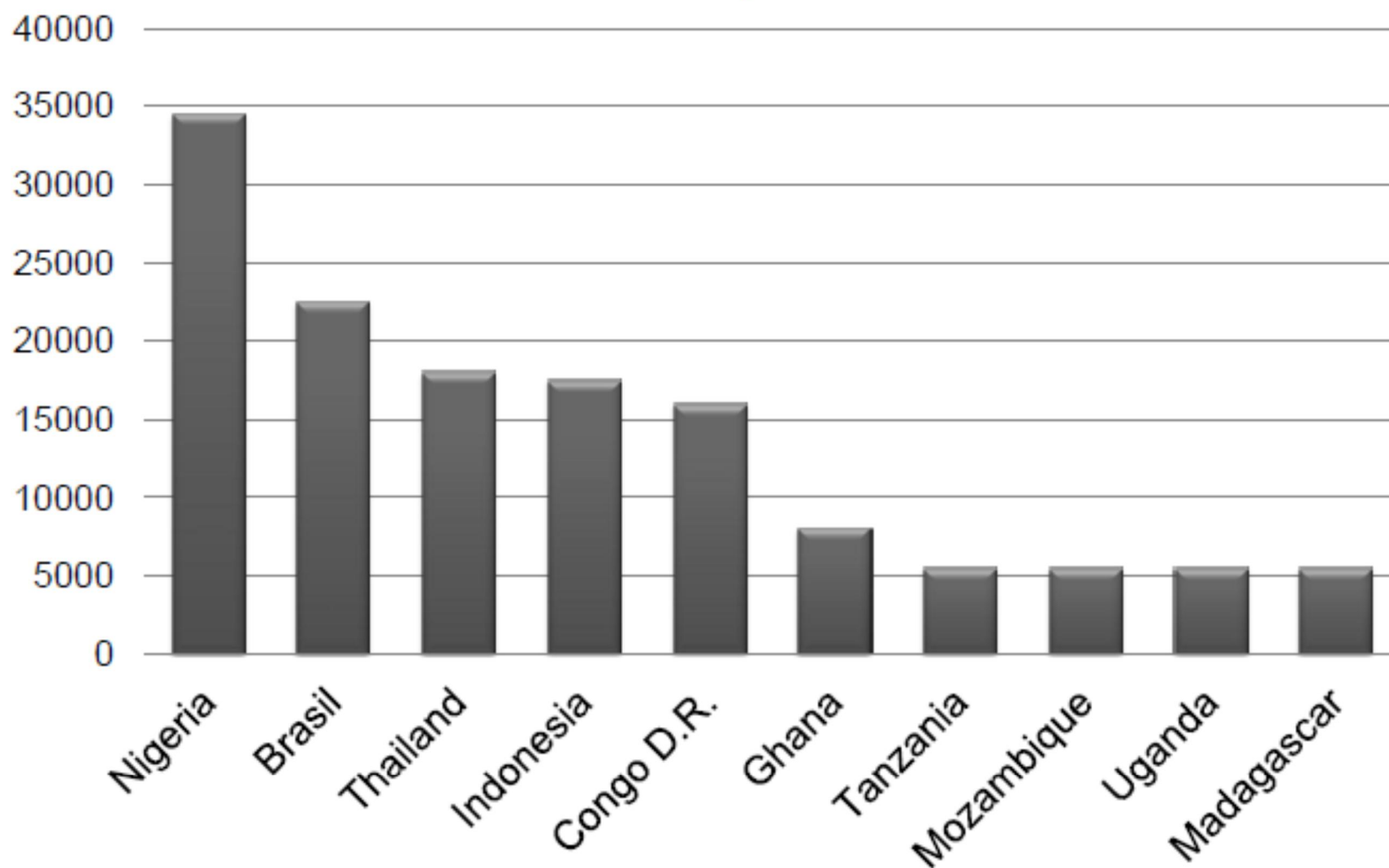
Cassava

- Cassava tubers may contain toxic cyanogenic glycosides, which need to be removed in the course of processing.
- Levels vary depending on cassava variety with levels such as up to 1000 mg/kg in “bitter” Cassava varieties versus 20 mg/kg with “sweet” varieties.
- The cyanogenic glycosides are easily removed in the processing stages



World production

Cassava root production



Sorghum Challenges

- Open pollinated low yielding varieties, unable to compete with other, higher yielding commodities such as maize and wheat
- Migratory birds can cause 100% crop loss for small scale farmers
- No post-emerging, selective herbicides are currently available for sorghum making it difficult to manage weeds after germination
- Unpredictable weather patterns, evidence of climatic change

Opportunities

- Development of high yielding varieties on going. Yields ranging from 4 - 6 - 8 t/ha on Africa realised compared to 1 to 3 t/ha with OPV's
- Birds repellents on trial
- Pre-emerging herbicides under development by introduction of seed safeners to protect the sorghum plant.
- Crop insurance can offer some risk mitigation on weather
- Sorghum can be grown in areas where maize crops are likely to fail subject to typical climate.

Farm Yield: Key-Success-Factor = Seeds “Classic” Varieties and Seed Multiplication versus Hybrids

Open pollinated low yielding varieties, unable to compete with other, higher yielding crops

Development of high yielding varieties on going. Yields 8 t/ha on Africa realised compared up to 3 t/ha with OPV's



Farmers can suffer 100% crop loss due to migratory bird damage

Migratory birds can cause 100% crop loss for small scale farmers

Birds repellents on trial with some success



Weeds can account for up to 30% field losses!

Post-emerging, selective herbicides are not currently available for sorghum making it difficult to manage weeds after germination

Pre-emerging herbicides under development by introduction of seed safeners to protect the sorghum plant.



Weather Damage

Unpredictable
weather
patterns,
evidence of
climatic change

Crop
insurance
can offer
some risk
mitigation on
weather



Sorghum Farming Potential



...Subject to custom tailored agri-package (inputs such as seeds, fertilizers, herbicides etc as well as best farm/crop management practice)

Cassava Products

raw tubers, shelf
live < 24 – 48 hrs



Chips/Flour



Cake for Brewing



Tapioca Starch For
Brewing



'Refining'

'Refining'

Summary

- There is need to develop a *“Sustainable business in Africa that create value for our shareholders and economic advantage for the communities within which we operate”* ... Paul Wash, Diageo CEO
- LRM production is in line with our sustainable agriculture guidelines
 - ✓ Improving water efficiency throughout our agricultural Supply Chain prioritizing crops from water stressed areas.
 - ✓ Improving energy usage and improving carbon emission in the growing and transport of our key ingredients
 - ✓ Playing a positive role in supporting local economies and livelihoods
- Sorghum is the preferred source of local cereal derived brewing extract, because it's uniquely adapted to the Africa climate, being drought resistant , resistant to water lodging as well as being quite robust to grow on lower quality soils. Sorghum has been proven to be a very competitive alternative to barley by cost and quality for lager beer brewing