IFIS International Food Ionizing Processing Symposium

Speaker name

Arved Deecke

BENEBION: Phytosanitary irradiation in Mexico. The first 10 years and an outlook to the next.

Introduction

- Mexico based contract sterilizer
- Plant location in Mexican state of San Luis Potosi
- Initial focus on phytosanitary treatments for fresh perishables
- Today diversified portfolio including medical devices, laboratory equipment, condiments, spices, perishables, pet treats and food, frozen foods.
- 12 years in operation

Matehuala, SLP Gamma Plant

Stages of implementation and growth

- Past
  - Business planning
  - Technology selection
  - Funding
  - Construction
  - Start of operation
- Present
  - Growth
  - Diversification
- Future
  - Expansion

STAGES OF GROWTH
BUSINESS PLANNING

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- Business proposal: Conceived October 2002 when the US government published Code of Federal Regulations 7CFR305 - PHYTOSANITARY TREATMENTS
- The regulation provided a framework on how ionizing irradiation could be utilized to protect US agriculture from invasive insect pests through international commerce with perishables.
- Many in depth conversations and analysis of requirements by potential customers and stake holders.
- Laying out the regulatory road map between nuclear licensing, phytosanitary frameworks
- Choosing technology that best meets customer goals
- Brokering agreements between Mexico and the US to enable use of the regulation
- Identifying and evaluating candidate locations for a plant.
- Creating business plan for investors / pitch opportunity for equity capital

STAGES OF GROWTH
TECHNOLOGY SELECTION

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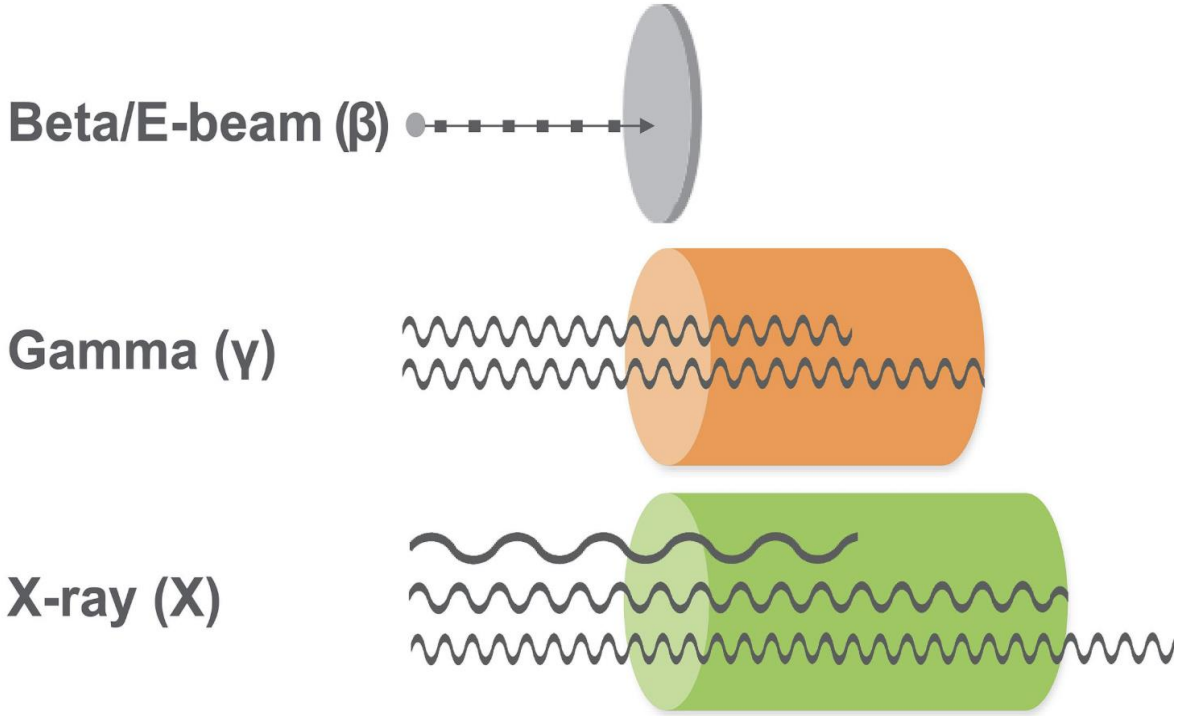
- Three available technologies:
  - Gamma
  - X-Ray
  - E-beam

- E-beam discarded as communication with customers made it clear that dynamic cycle time (in/out) was key and goal of 45 minutes per truck could only be met by treating on a pallet level.

- X-Ray was still emerging at the time with some perceived or real technology risk. The high cost of capital was a problem at the time.

- Gamma was chosen as a mature technology with lower initial investments and a growth path forward. Isotope market was reliably stable at the time. Canadian Suppllier NORDION was chosen as technology provider.



STAGES OF GROWTH

Funding

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Early angel investors 2003:

- Enough initial capital to fund business planning stage, build alliances and relationships, start moving regulatory obstacles.

Second floor investors 2006-2008:

- Capital investment for land purchase, down payment for equipment. Scaling of workforce.

Bank loan 2008-2011:

- Fully fund company through start of production

Additional capital to sustain growth

- Cover cash burn up to profitability

STAGES OF GROWTH

Construction

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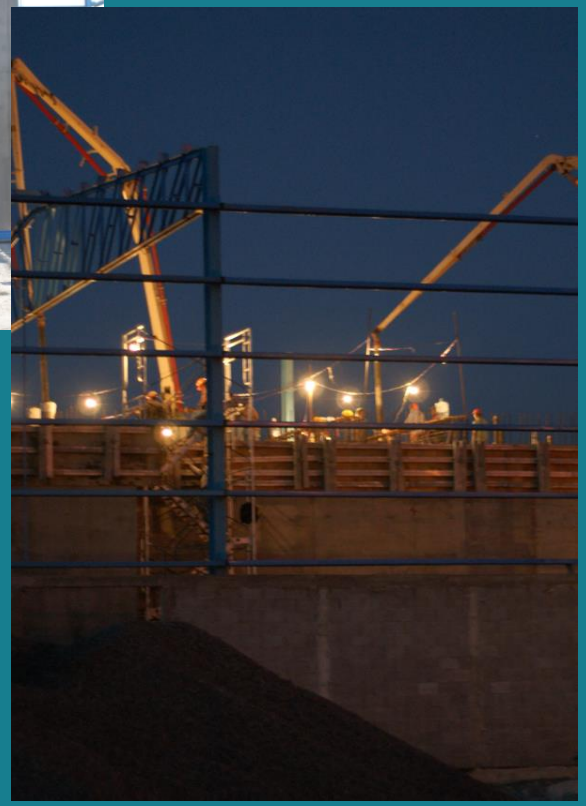

- Core component of construction shield was 2’500 m^3 concrete with source storage pool.
- We contracted NORDION civil engineering package which was well thought out and easy to execute against.
- Engineering challenge was to get the concrete to sufficient density given the light limestone aggregates in the area.
- Electric arc furnace slag from a local steel production plant was used with good success to get density to specification.

Start of Operation

2012

Licensing complete

- Construction license nuclear commission
- Operational license nuclear commission
- Import permit nuclear commission
- Municipal and federal permits and licensing

Isotope import and loading

Operations qualification

2012

Dose mapping of radiation field
Process qualifications (PQ) or USDA configuration testing
Certification 461 USDA / APHIS
Certification NAPPO / SAGARPA

Stage 2:
Growing the Business

From 2012 on the company grew its treatment volumes in htree different ways:

- Treatment of phytosanitary commodities that were approved and could not be treated in any other way.
- Approval of new commodities
- Disruption of existing treatment protocols

Business Development

2012-2014

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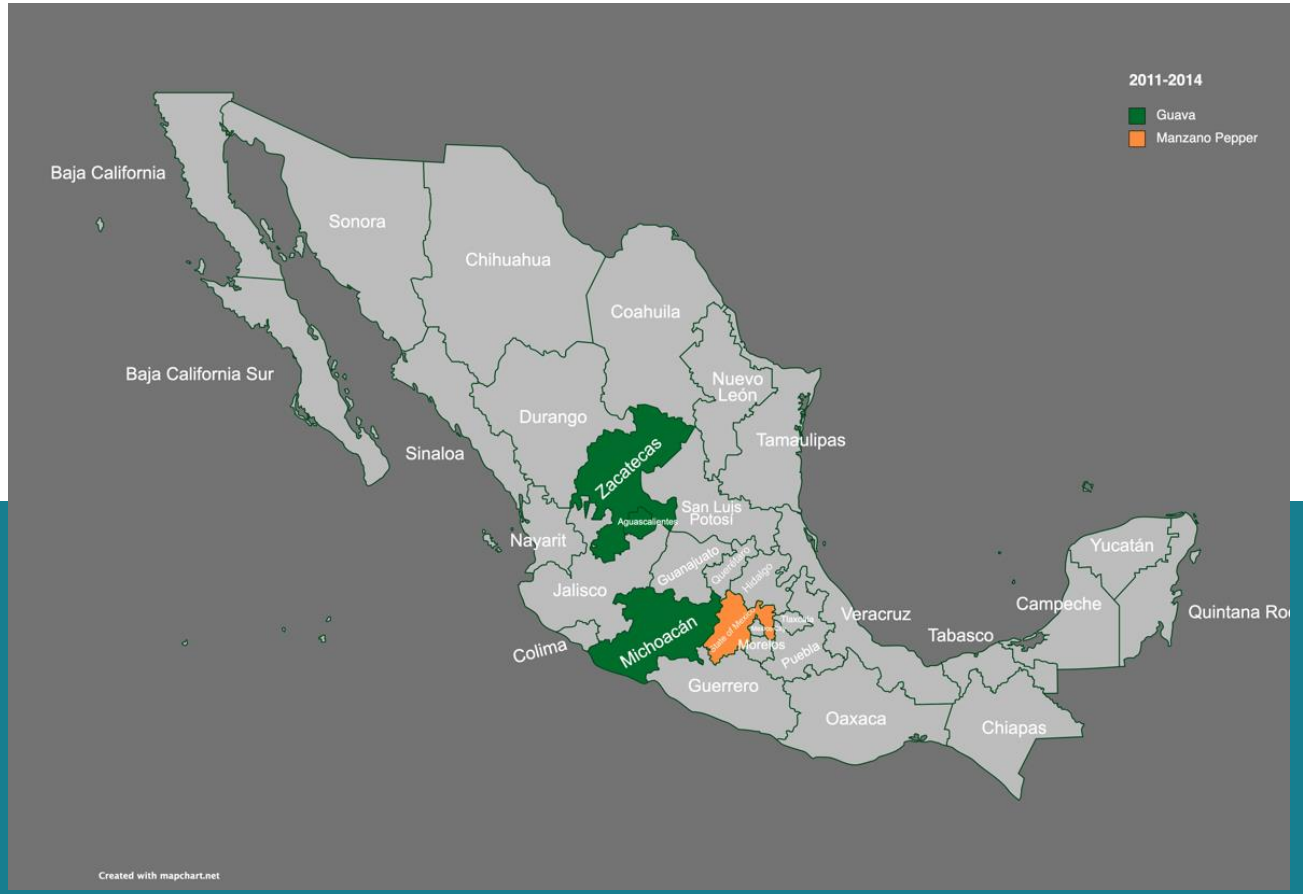
Initial revenue for the first two years came from previously approved guava and manzano peppers from central Mexico.



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Business Development

2015-2018

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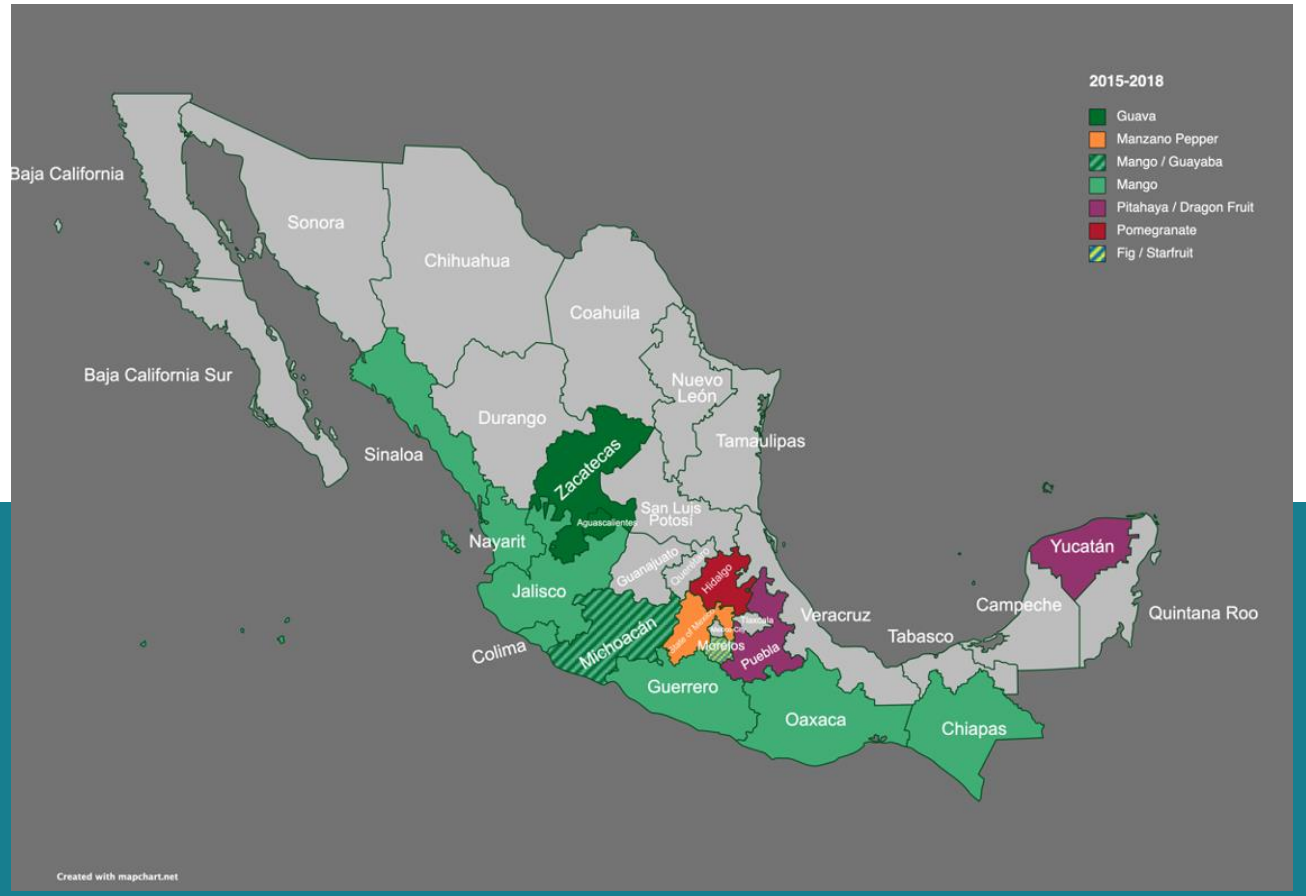

Additional commodities saw approval in 2015 including mango, pitahaya, passion fruit, starfruit and fig

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Business Development
2018-2023

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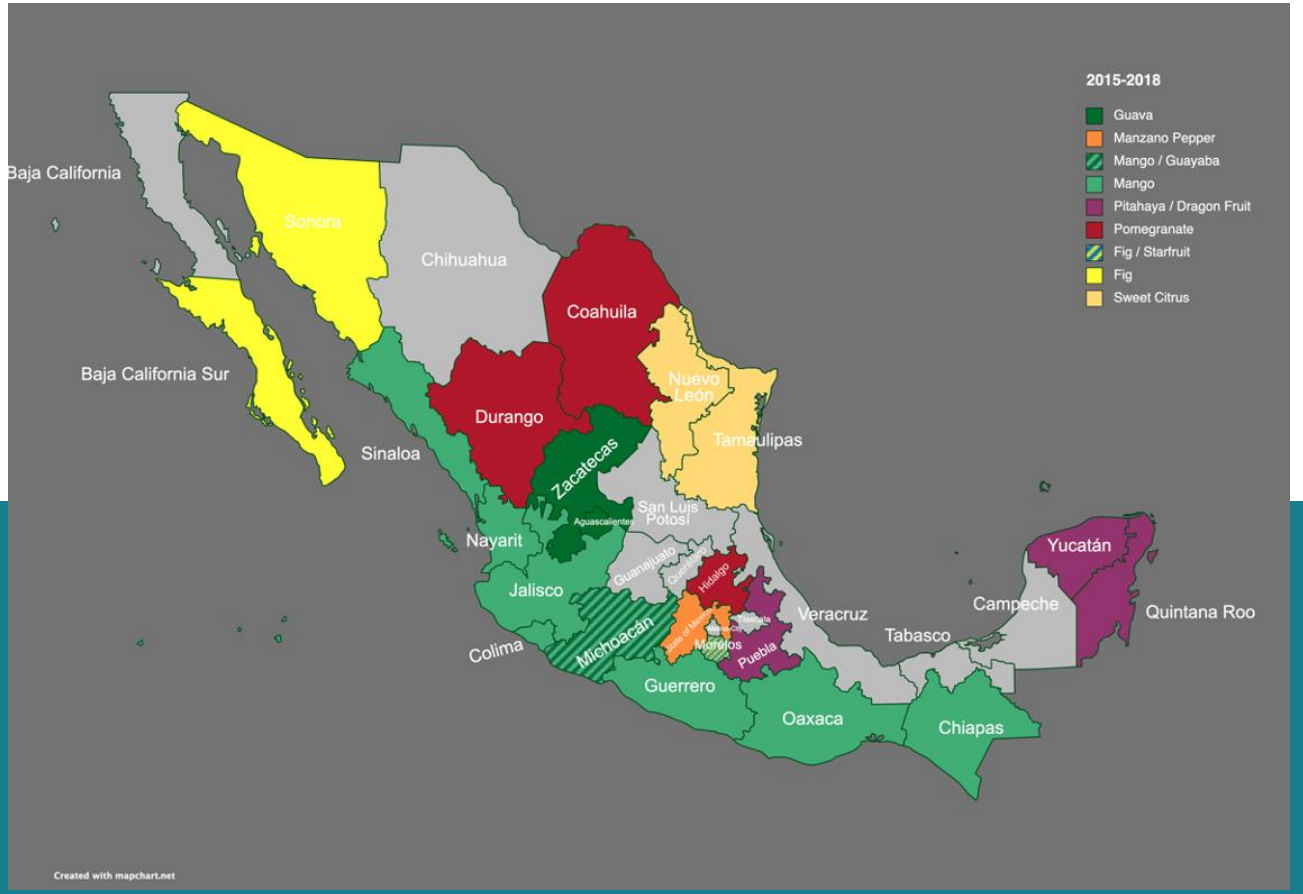

After 2018 we saw increasing treatment volumes from fruit that had alternative / traditional treatment protocols available. Disruptions of the status quo happened within the sectors of mango and sweet citrus and are still ongoing.

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Business Development

2024-

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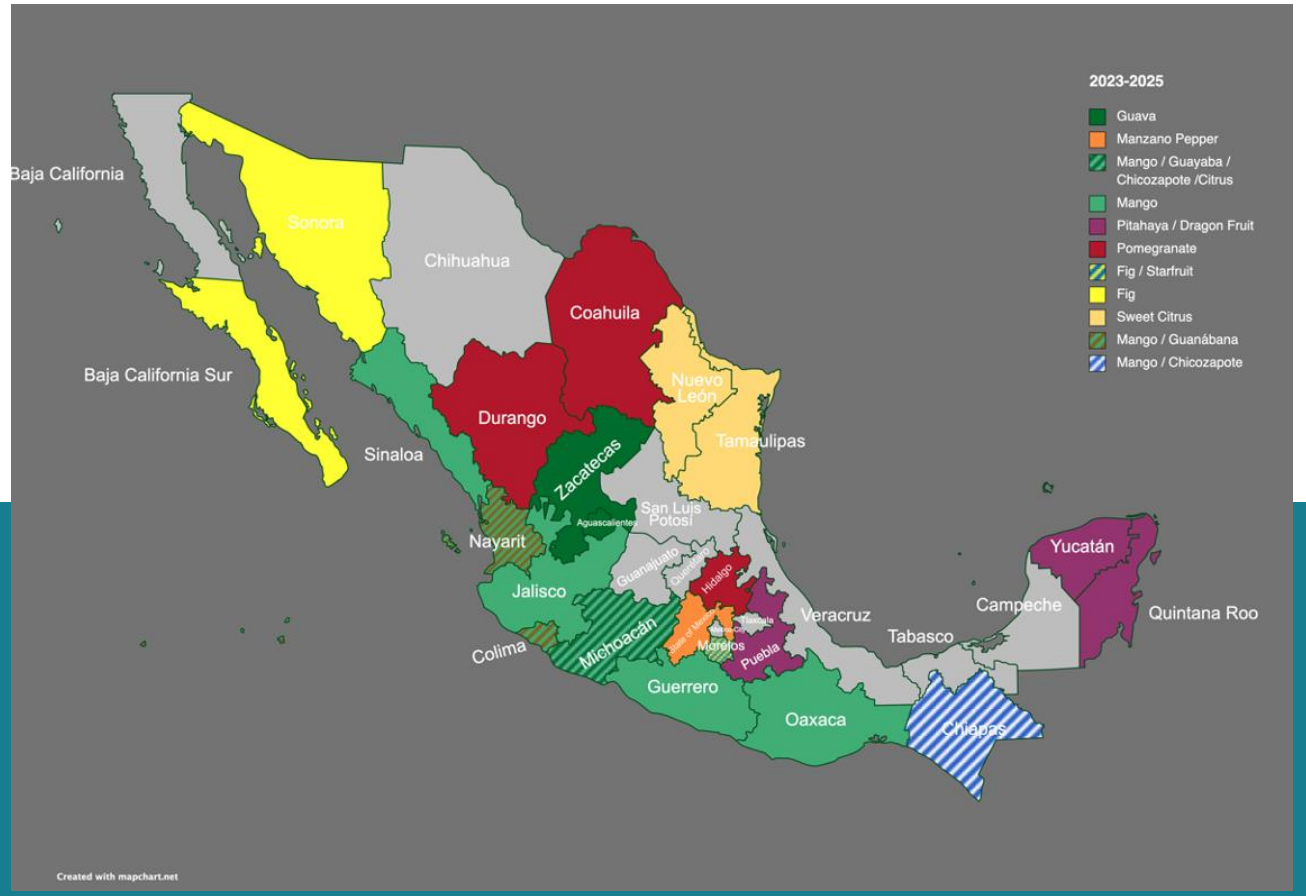

Expected Approvals for the near term are chicozapote, guanabana and possibly mamey.

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Haitian Variety Madame Francis

Now grown in Mexico

Nam Doc Mai from Thailand

Osteen from Spain

Business Development

2012-2022

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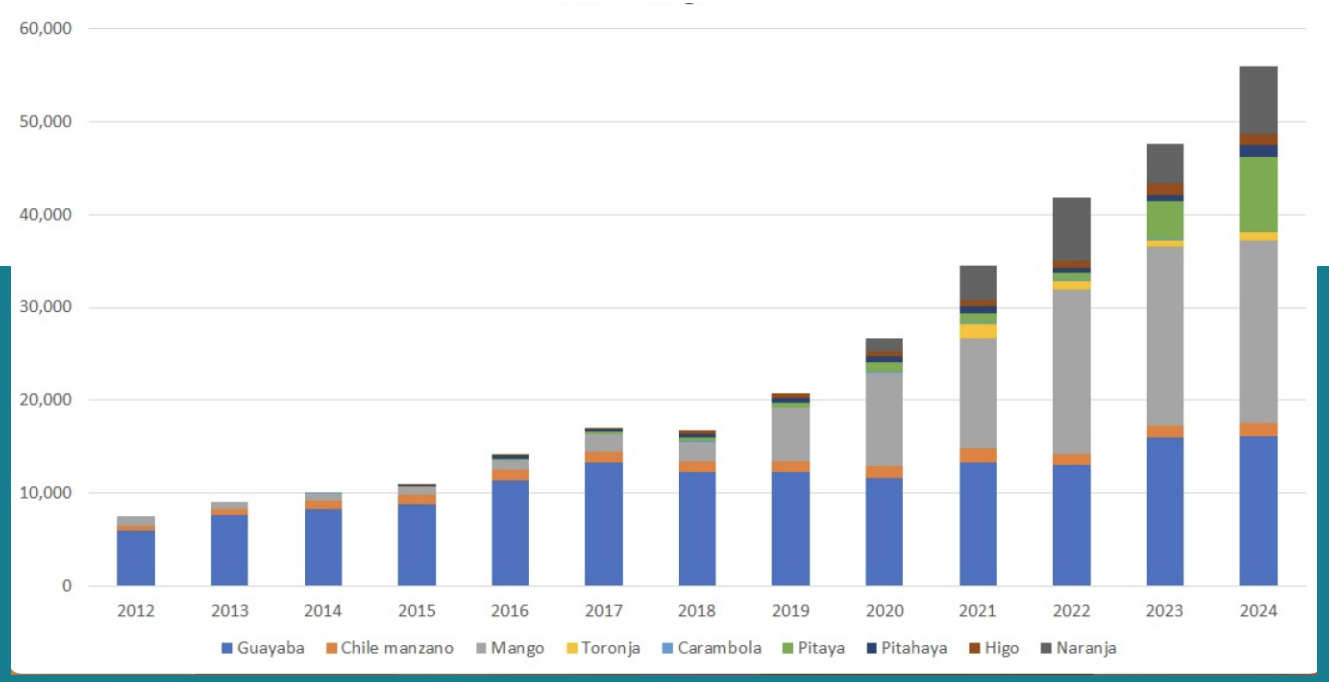
Steady growth in treatment volumes through disruption and new approvals as some commodities gain maturity of supply and demand. Trend continues.

Annual production by commodity in metric tons



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STAGES OF GROWTH

2015- Diversification

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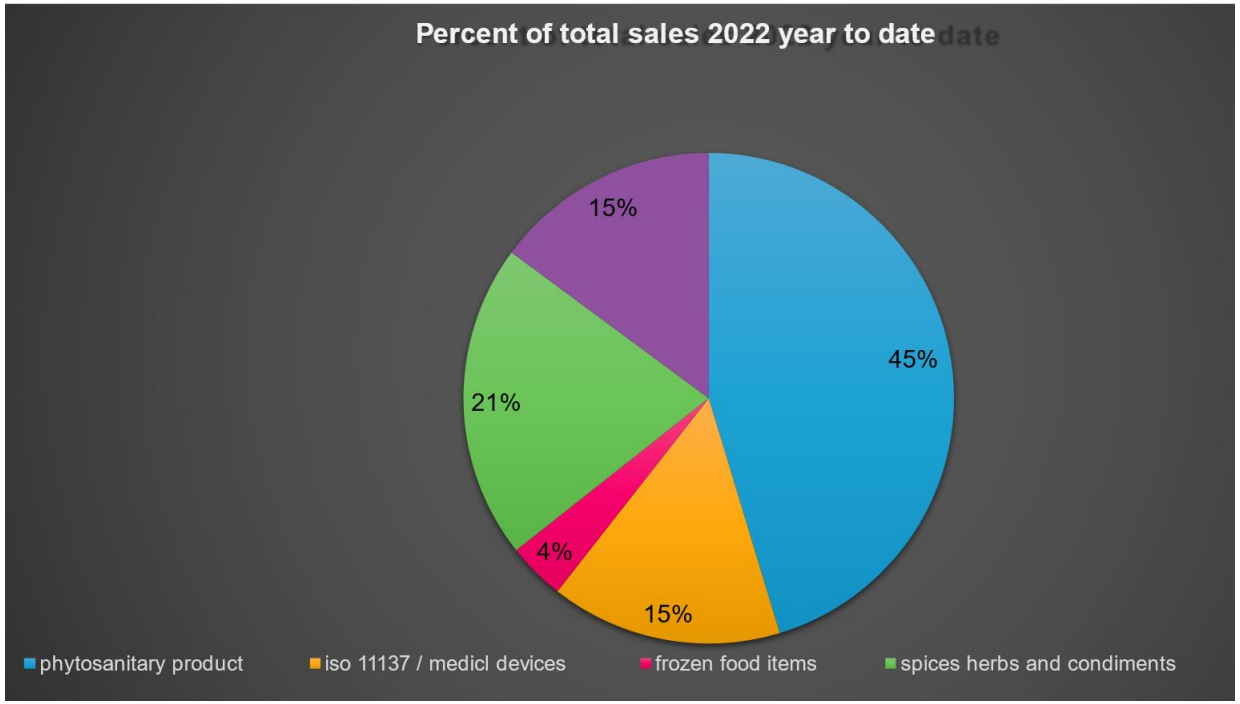
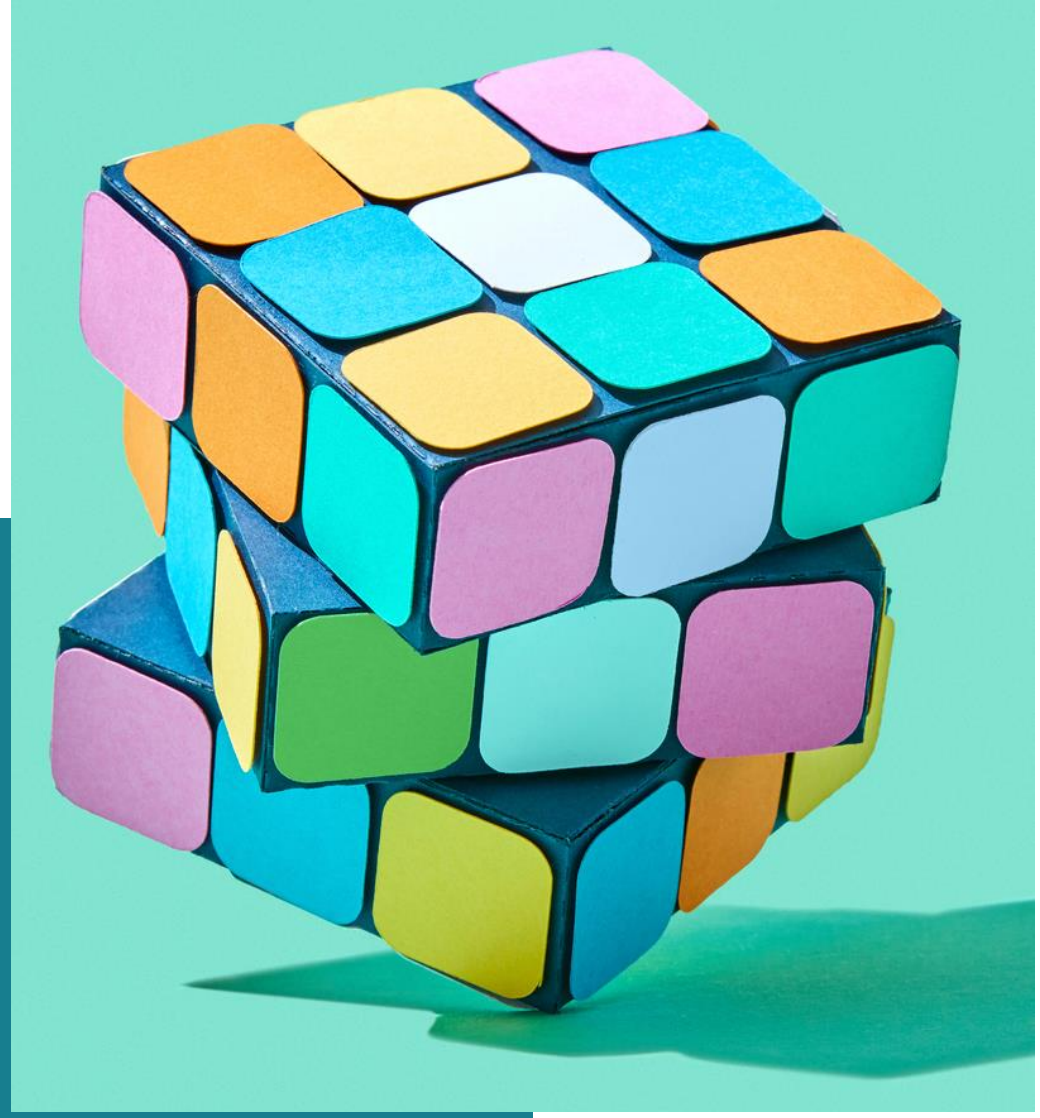
Sufficient positive cashflow to create activity required to contend in high dose applications:

- Spices and condiments 2015-
- ISO14385 certification and ISO11137 compliance by 2018
- Today a balanced portfolio

- Phytosanitary,
- Medical devices,
- Laboratory equipment,
- Pet foods and treats
- Spices
- Condiments
- Frozen foods





Future expansion Challenges 2023

- At this point we have 3 times more isotope than can be safely used to treat fruit (mechanical limitations)
- 9h of fruit a day with remaining isotope under water
- This time will increase continuously
- Law of diminishing returns on additional investment into isotope
- Perhaps Uncertain isotope supply

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Thanks.

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