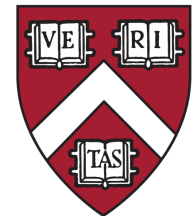


Exploiting the plant *Quillaja saponaria* as a source of therapeutic compounds - discovery and industrial production

Global Health, Biodiversity, and Therapeutics Seminar



June 9th, 2023
Cambridge, Massachusetts

Jennifer Alfaro, PhD
Eli Khayat, PhD
Gaston Salinas, CEO

Advanced Botanical Materials (ABM)

- Novel R&D Platform for production of high purity & consistency, low-cost key ABM
- Tissue culture avoids supply & quality issues associated with traditional botanicals
- IP: Trade secrets & patents.
- **ABM-01**: based on *Quillaja saponaria in vitro* plants

Market Segments

\$60²
billion

TAM

Agriculture - Crop Protection

- Novel Fungicide Quillibrium® / Botristop
- Pipeline of New Plant Based Biopesticides

TAM

\$41³
billion

Pharma - Vaccines & Adjuvants

- Truly sustainable supply of GMP QS-21
- Additional adjuvants derived from Q.S. compounds



¹Data source: *Global Botanical Extracts Market Size, Share, Growth*.

²Dunham&Trimmer,2019

³<https://www.marketsandmarkets.com/PressReleases/vaccine-technologies.asp>



QS-21 Adjuvanted Vaccines

- Vaccines in the market: Shingrix (Shingles, Arexvy (RSV), Mosquirix (Malaria)
- AS01b/e: Commercially relevant adjuvant containing QS-21
- Tens of candidates in clinical trials for broad targets
- Shingrix alone has demanded over 5.3kg of QS-21 to date



QS-21 GMP
\$400k per g



REVENUE	
2022	2028(p)
\$3.7b	\$8b
↓	
37.7%	
\$9.8b	



Source: GSK



ABM-01: *Quillaja saponaria* (soapbark tree)



**Tissue Culture &
Genetics**



**Raw
Materials**



**Crude
Extracts**



**Enriched
fractions**



**Pure
Compounds**



Value Proposition

Attributes	Traditional Source	BSI's ABM-01
Compound	QS-21	QS-21
Origin	Tree Bark	Tissue culture
Biomass Supply	Limited by Government	Virtually unlimited
Sustainability Profile (raw materials)	Old trees sacrificed	Truly sustainable
Purity (Quality)	Variable	Consistent

Traditional

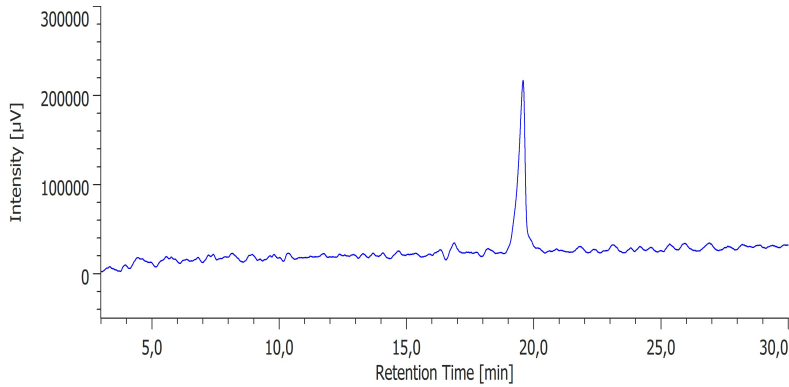


Truly Sustainable

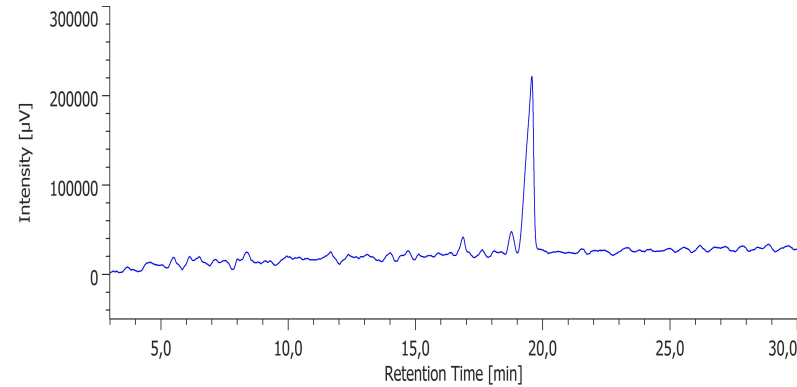
GMP QS-21



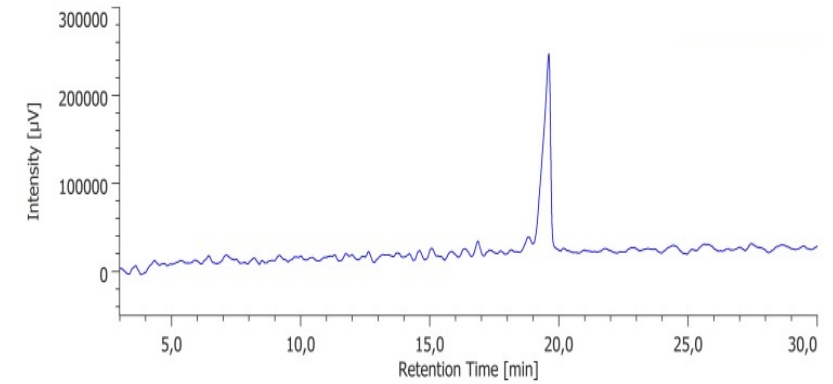
BSI QS-21 (100 μ g)



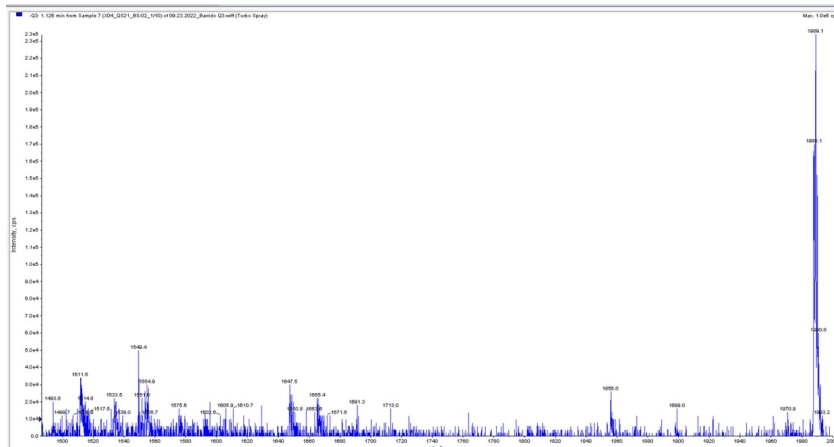
CRODA QS-21 (100 μ g)



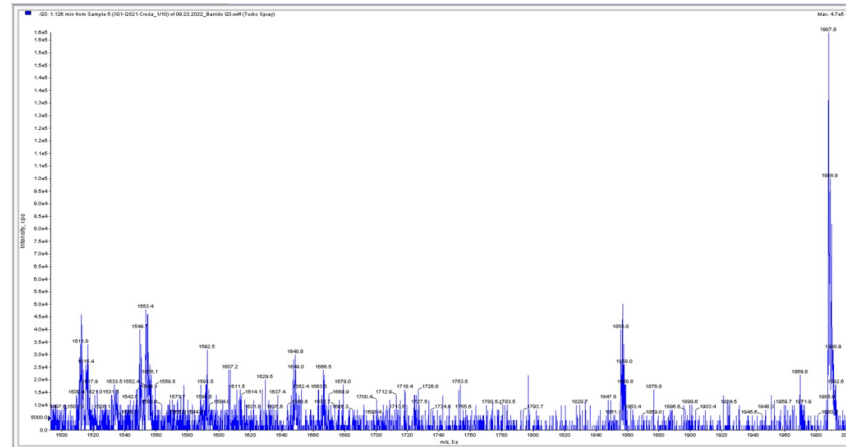
DK QS-21 (100 μ g)



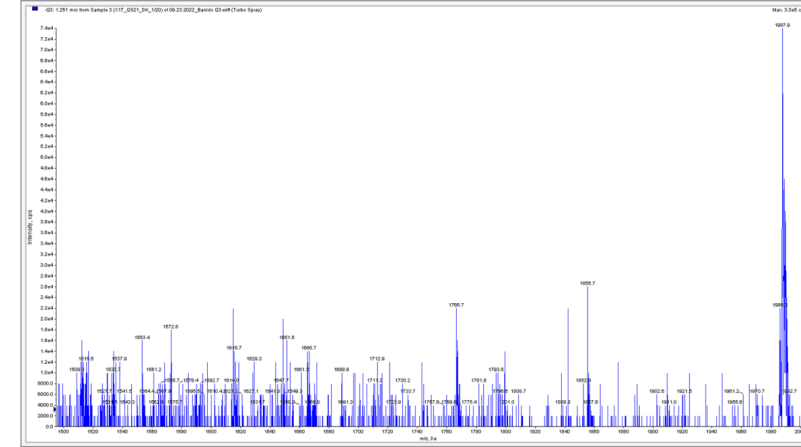
BSI QS-21 (1500-2000 m/z Da)



CRODA QS-21 (1500-2000 m/z Da)



DK QS-21 (1500-2000 m/z Da)

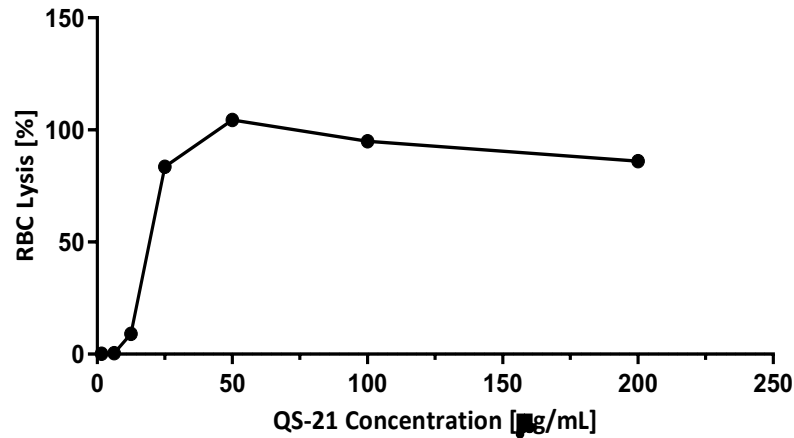




HEMOLYSIS ASSAY: Human erythrocytes

BSI

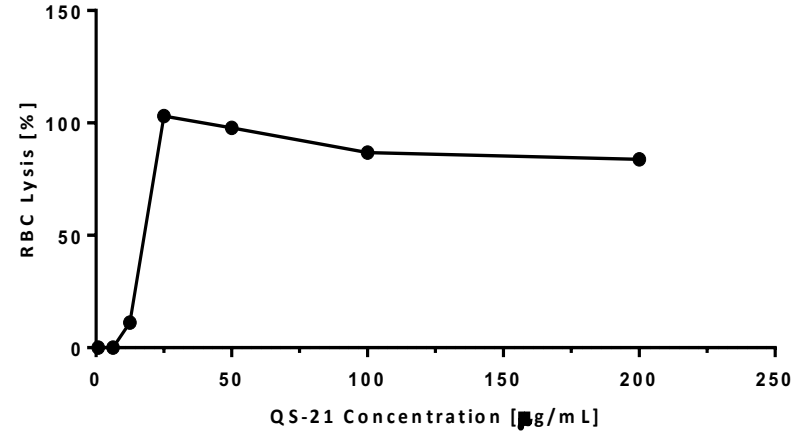
Hemolysis Assay



IC50: 18.06 µg/ml

CRODA

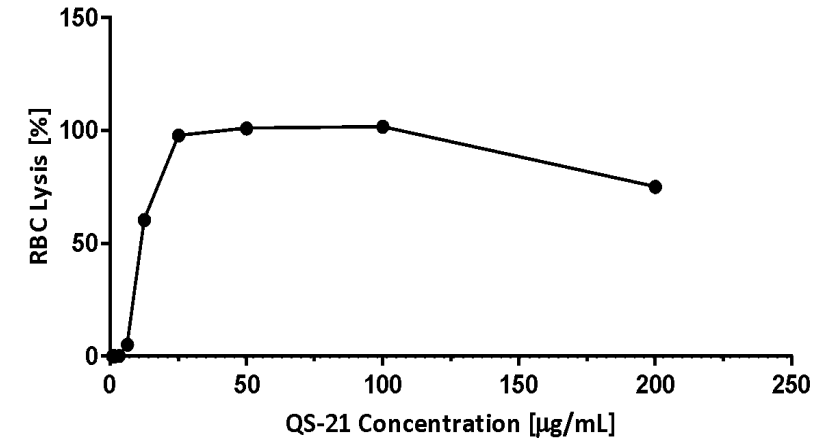
Hemolysis Assay



IC50: 13.55 µg/ml

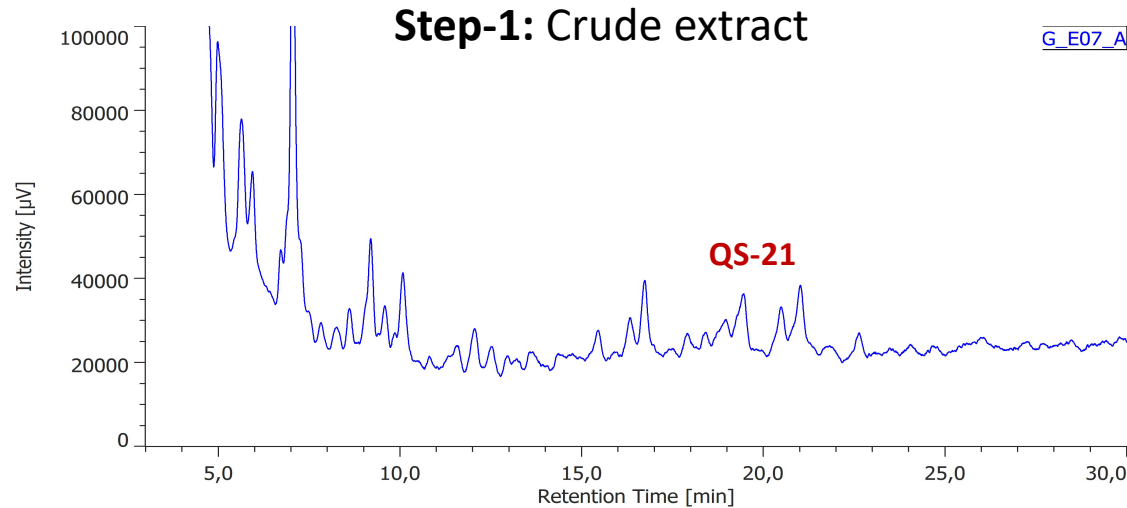
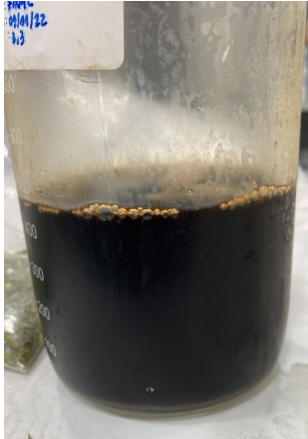
DK

Hemolysis Assay



IC50: 11.24 µg/ml

% Hemolysis = ((absorbance of sample – absorbance of PBS) / (absorbance of water – absorbance of PBS)) * 100



**Quest to increase QS-21
yield in QS Cultures to
enable the production
at Kilo scale**

High Diversity of Ecotypes in Nature

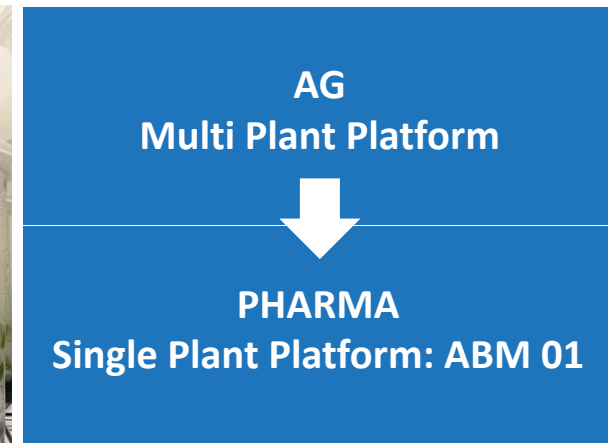


STRATEGY

- Incremental gains
- Radical gains - MOONSHOT



ABM for Ag & Pharma Applications



SPECIALITY CHEMICALS MAGAZINE

SPECICHEMONLINE.COM

MAY/JUN 2021

TO BE CONTINUED

Progress in
continuous processing

FLOWS NATURALLY

Integrating flow into the mix

ALSO IN THIS ISSUE

Agrochemicals • Flame Retardants • Regulation & Compliance • Pharmaceuticals • DCAT Week Preview

Innovation grows on trees

A lab-grown tree is the source of both a biofungicide and an adjuvant for a COVID-19 therapy. We spoke with **Gaston Salinas** of **Botanical Solution**

The last few months have seen some major developments for US start-up firm Botanical Solution (BSI). At the end of 2020, it secured \$3.3 million from multiple banks and 'angel' investors in a seed round of funding, with a further \$6 million round planned shortly.

After several years of partnership in Chile, the company also reached an agreement with Syngenta to commercialise its first product in Peru and Mexico. More significantly still, it made its first moves towards the pharma market.

Co-founder and CEO Gaston Salinas, an industrial engineer by training, spent the early part of his career in his native Chile, working on new product development. He met his business partner, biologist Gustavo Zúñiga, by chance in 2010.

Zúñiga had worked with native plants from the continental and Antarctic regions of Chile and combined biotech with them. Many of these were not easy to source because of their remoteness, so he studied lab-grown versions too.

In the case of *Quillaja saponaria* Molina, he found that those he grew in his own lab generated specific phenolic compounds, different to those they would generate in wild conditions, and that these had fungicidal activity. The technique was patented in the US in 2012 and in Europe in 2013.

"The interesting thing is that in natural conditions, the tree does not produce these compounds spontaneously in sufficient quantities



Salinas

Thank You!

Contact Information

Gaston Salinas

gaston@botanicalsolutions.cl

Jennifer Alfaro

Jennifer@botanicalsolutions.cl

Eli Khayat

eli.khayat@botanicalsolutions.cl