"Building International Cooperation on Arid Zones Research “
"Valorization of native flora of Chile: a way to innovate in agribusiness"

Lida Fuentes Viveros
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Centro Regional de Estudio en Alimentos y Salud CREAS-Sede INIA La Cruz
www.creas.cl

Santiago, 17 de noviembre 2014
CHILE HAS UNIQUE PLANT SPECIES
LOST OF NATIVE FLORA

Central Region

Adison Altamirano y Antonio Lara et al, BOSQUE 31(1): 53-64, 2010

South Region (Valdivia)

TYPICAL USES

• Mapuche tradition

• Touristic place

• Garden design

• Gourmet cousin

• Pretty cut flowers

• Mapuche medicine

[Images and links]

www.sernatur.cl

http://www.fabioreyes.cl/

http://www.mapuexpress.net/content/news/print.php?id=5781
MEDICINE USES OF SPECIES FROM VALPARAÍSO REGION

**Peumo**

**Boldo**
Boldin, antioxidants

**Espinó**

**Chagual**

**Quillay**
Saponins

**Alstomeria**
Commercial products
Tea, extract, shampoo
PRODUCTIVE POTENTIAL OF PATAGONIC FRUIT

Juliana Torres y Colaboradores, 2010
RESEARCH OF EDIBLE FRUITS

Chilean Strawberry (*Fragaria chiloensis*)

Maqui (*Aristotelia chilensis*)

Calafate (*Berberis buxifolia*)

Murta (*Ugni molinae*)

Arrayan (*Luma apiculata*)

Peumo (*Cryptocarya alba*)

Antioxidant pattern

Breeding program

Healthy function
BREEDING PROGRAMS

Ivette Seguel, INIA, Carillanca, TA 96, 2011

Benjamín Varas et al., Identification and Characterization of Microsatellites from Calafate (Berberis microphylla, Berberidaceae) Applications in Plant Sciences, 1(7) 2013. INIA La Platina-Concepcion University.

Proyecto FONDEF “Screening de material genético y desarrollo de técnicas de manejo de maqui (Aristotelia chilensis) para mejorar la oferta de materia prima exportable y agroindustrial” Talca university.
NATIVES FRUIT
¿SOURCE OF BIOMOLECULES?

FROM SPEISKY ET AL, 2011

Escribano-Bailón, 2002; Miranda-Rottmann, 2002; Rubilar, 2006; Suwalsky, 2007; Fredes et al, 2009; Ruiz 2010; Shene 2012; Rojo et al, 2012

Desde Speisky et al, 2011
ACTIVIDAD ANTI-DIABETES DE ANTOCIANINAS DE MAQUI

The wellness products are according to new consumer requirements: natural and environmental friendly products.

The nutricosmetic products are foods or ingredients related to anti-age and healthy.

The consumers are searching for new product

Functional foods -US$ 800 billions
The growth rate is increasing
Europe and Japan are principals producer
MARKET CONSIDERATION FOR COMERCIALIZABLE PRODUCT

Competitively

**Wellness market:** Big number of patent related to antioxidant. There are few product, one is green tea, with real functional properties.

**Business model:**
Harvest type, specie availability and recollection center has been contemplated

**Agree value such as** “bioactive molecules” “Real healthy potential” “economical and social development” are key for a good marketing.
NATIVES FRUIT ON NUTRICOSMETIC MARKET

- Anti-age juice
- Pills and powder for diabetes and high cholesterol treatment
- Anti-age cream
### Antimicrobial activity of arrayan and peumo

<table>
<thead>
<tr>
<th></th>
<th>Polyphenols [gAG/100g]</th>
<th>FRAP [mM FeSO₄]</th>
<th>TEAC [Eq.Trolox/100gFW]</th>
<th>DPPH [μM]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arrayan</td>
<td>83.64±3.26</td>
<td>23.81±1.50</td>
<td>18.00±2.10</td>
<td>19.16±0.60</td>
</tr>
<tr>
<td>Peumo</td>
<td>51.69±2.43</td>
<td>9.85±0.38</td>
<td>9.46±1.12</td>
<td>14.38±0.48</td>
</tr>
<tr>
<td>Blueberry</td>
<td>48.86±1.60</td>
<td>10.23±2.45</td>
<td>9.94±2.27</td>
<td>17.36±0.83</td>
</tr>
</tbody>
</table>

**Antimicrobial effect**

Franco et al, submitted to Journal of Food Protection
VASCULAR PROTECION OF PEUMO AND ARRAYAN

A

Peumo-H

Control
HG
HG + Peumo-H (0.1 mg/ml)
HG + Peumo-H (1 mg/ml)
HG + Peumo-H (10 mg/ml)

B

Arrayan-H

Control
HG
HG + Arrayan-H (0.1 mg/ml)
HG + Arrayan-H (1 mg/ml)
HG + Arrayan-H (10 mg/ml)

C

Arrayan-F

Control
HG
HG + Arrayan-F (0.1 mg/ml)
HG + Arrayan-F (1 mg/ml)
HG + Arrayan-F (10 mg/ml)

HG: High glucose
Ach: acetylcholine

Fuentes et al, manuscripts unpuplished (Food chemistry)
Quinoa (*Chenopodium quinoa*)

- **Bolivia**
- **Protein:** 12 - 20%
- **Vitamin:** B, E
- **Minerals:** Ca, Zn, Li
- **Phytoestrogens**
- **Ingredient for advanced nutrition**
- **Gluten free**
- **Saponin removing**

Bread

INIA, PUC
**Pro-biotic preservation using fructo-oligosacarides biosynthesis from sugars of black algarrobo**

**Black algarrobo (Prosopis nigra)**
Tree of Gran Chaco Region (Argentina), Bolivia, Paraguay and Uruguay.
Edible vain

Andrea Gómez-Zavaglia PhD (Argentina), María Elvira Zuñiga-Hansen PhD (Chile)
Contact: Nelson Romano (romanobiotech@gmail.com)

Flour with high sucrose content (~50% Dw of vaina).

Enzymatic synthesis

**Fructo-oligosacarides**
(Fruₙ- Glu with prebiotic properties).

**APLICATION**
Protection of lactobacillus during process (liophylization, spray-dry, frozen).
Prosopis chilensis

In-vitro propagation, Cristian Ibañez, Universidad de la Serena
DIFFUSION ACTIVITY
THE BIODIVERSITY IS THE BEST FRIEND OF FOOD INNOVATION
PROYECTOS CREAS EN FLORA NATIVA
EFECTO PROTECTOR DE EXTRACTO MURTA EN CELULAS SANGUINEAS

CONTENIDO DE ANTOCIANINAS EN MAQUI

Table 2 Contents (expressed in equivalents of delphinidin 3-glucoside) and proposed identities of the anthocyanins detected in the berries of *Aristotelia chilensis*.

<table>
<thead>
<tr>
<th>Anthocyanin</th>
<th>Content (mg/100 g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delphinidin-3-sambubioside-5-glucoside</td>
<td>46.4 ± 0.1</td>
</tr>
<tr>
<td>Delphinidin-3,5-diglucoside</td>
<td>23.7 ± 0.2</td>
</tr>
<tr>
<td>Cyanidin-3-sambubioside-5-glucoside</td>
<td>18.7 ± 0.2</td>
</tr>
<tr>
<td>Cyanidin-3,5-diglucoside</td>
<td></td>
</tr>
<tr>
<td>Delphinidin-3-sambubioside</td>
<td>14.2 ± 0.1</td>
</tr>
<tr>
<td>Delphinidin-3-glucoside</td>
<td>17.1 ± 0.2</td>
</tr>
<tr>
<td>Cyanidin-3-sambubioside</td>
<td>8.9 ± 0.04</td>
</tr>
<tr>
<td>Cyanidin-3-glucoside</td>
<td>8.6 ± 0.05</td>
</tr>
<tr>
<td>Total anthocyanins</td>
<td>137.6 ± 0.4</td>
</tr>
</tbody>
</table>

EFECTO DE EXTRACTO Y MURTA SOBRE ENZIMAS DIGESTIVAS

Rubilar M, Jara C, Poo Y, Acevedo F, Gutierrez C, Sineiro J, Shene C.