

Chilean Crops with Potential for Functional Foods

EULAFF
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Chilean Crops with Potential for Functional Foods

- **Fundación Chile**
 - Introduction
 - Plant biotechnology
 - Ingredients
- **Chilean crops**
 - Exports
 - Annual crops
 - Auctoctionous species

Fundación Chile

- Private, non-profit institution
- Created in 1976 through an agreement between the Government of Chile and ITT Corporation
- Mission: to add economic value to Chile's products by promoting innovation and technology transfer activities, aimed at taking better advantage of Chile's natural resources and productive capacity

Fundación Chile

Technology Transfer Mechanisms

- R&D and adaptation of foreign technology for product and process innovation
 - Entrepreneurial joint ventures
 - Services
- Promotion of technology
 - Consortia for pre-competitive horizontal R&D
- Technology antenna and technology diffusion to SMEs
 - Seminars, technical assistance, technological reports
- Institutional innovation
 - Reducing transaction costs
 - Market development in incomplete markets
 - Public-private partnerships for institutional development

Fundación Chile

Examples of Innovation in Chile

- Salmon farming
- Standardized meat processing and distribution
- Fruit quality control and certification
- High quality goat cheese production
- Quality wine production
- Berry crops
- Rapeseed oil production for salmon feed
- Micropropagation of ornamentals
- Lota tourist circuit
- Forest securitization

Fundación Chile

Plant Biotechnology Program

- Initiated 1997
- Program Goals
 - Promote development of biotechnology-based industry in Chile
 - Strengthen R&D in Chile
 - Add value to Chilean production
 - Establish Chile as a developer of technologies for the Southern Cone

Fundación Chile

Plant Biotechnology Program

- Strategic alliances
 - 1998 joint venture in biotechnology, Biogenetic S.A, with InterLink Associates (US)
 - 1999 Alliance in grape and stone fruit biotechnology R&D with INIA
 - 2000 R&D agreement in grape biotechnology with Agricola Brown
 - 2000 joint venture in radiata pine biotechnology, GenFor S.A., with Silvagen (now CellFor) (CA)
 - 2002 R&D agreement in stone fruit biotechnology with the Andes Nursery Association
 - 2002 R&D agreement with Okanagan Biotechnology (CA)
 - 2005 Technology consortium Biofrutales S.A.

Technology Consortia

- Chilean Interagency program initiated 2004
- CONICYT, CORFO & FIA, with World Bank
- Joint call for preproposals submitted to one of three agencies
- “Association of technological entities, including universities, and commercial enterprises for the joint development of a program/project in the areas of research, development and innovation”
- Full proposal by invitation of one of the agencies
- Funding for up to 5 years and up to US\$ 5 million
- Proposal integrating programs in grape and stone fruit genetic engineering, grape and stone fruit functional genomics, and grape and stonefruit breeding was submitted and approved by CONICYT

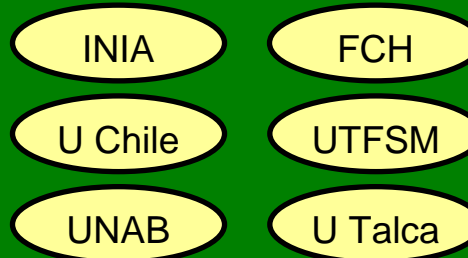
Biotechnological Innovation in the Production of New Varieties of Grapes and Stone Fruit

Consorcio Tecnológico en el Ámbito Frutícola

Empresas Viveristas



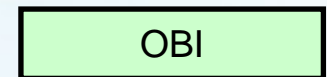
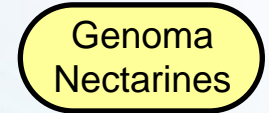
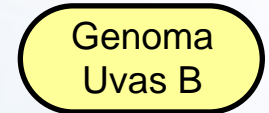
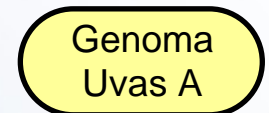
Entidades Tecnológicas



Organización Representativa



Sociedades Comercializadores Vinculados



PBCT Consorcio Tecnológico

Biofrutales Programs

Grapes

- Functional Genomics
 - development of physical maps for table grapes
 - development of molecular markers for genes associated with characters of economic importance
 - isolation of promoters for expression of genes in fruit
 - functional genomics of impacts of viruses on table grape quality
- Molecular Marker-Assisted Breeding
 - development of new varieties of table grapes
- Genetic Engineering
 - development of grapes with resistance to viral and fungal diseases
 - introduction of candidate genes associated with berry size and quality in table grapes

Stone Fruit

- Functional Genomics
 - identification and validation of candidate genes associated with wooliness
 - development of molecular markers related with wooliness and soluble solids content
 - isolation of promoters for expression of genes in fruit
- Molecular Marker-Assisted Breeding
 - development of new varieties of peaches/nectarines with and emphasis improved postharvest life
- Genetic Engineering
 - protocols for transformation of peaches/nectarines
 - introduction of candidate genes associated with wooliness

Plant-derived Ingredients for Salmon Feed

- Relative scarcity of fish oil and fish meal resulting in rising prices
- International efforts to find replacements
- Restrictions on the use of ingredients of animal origin
- Concerns about GMO ingredients

Trigo



Raps



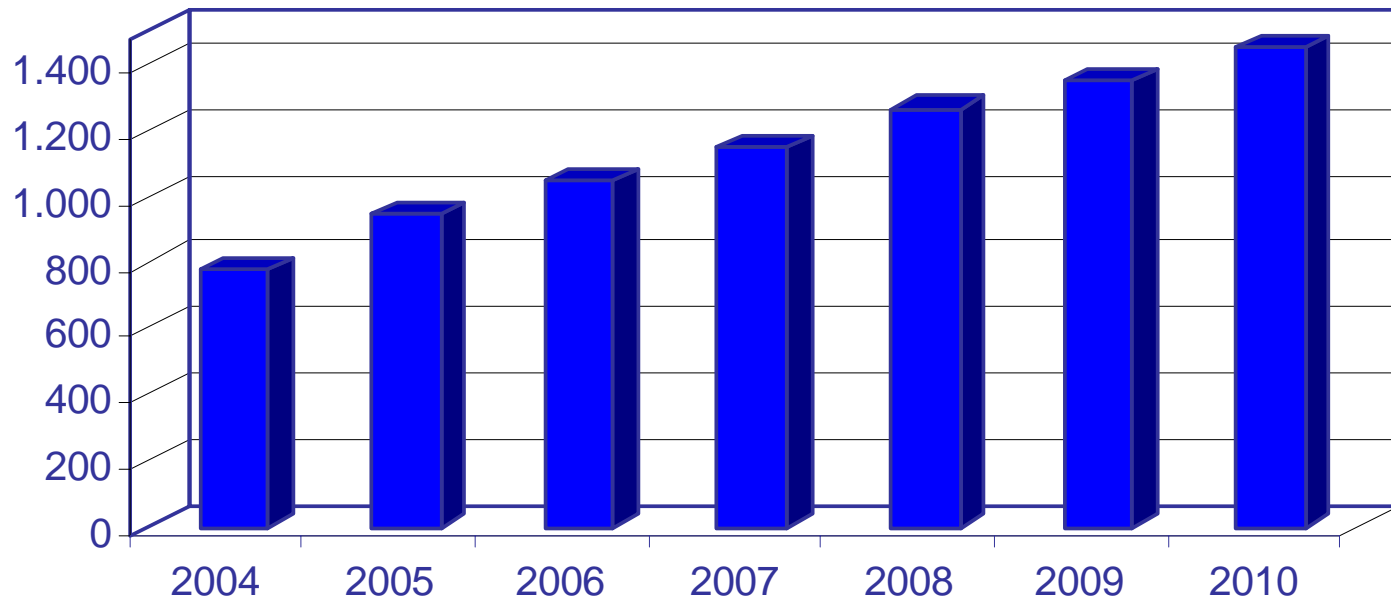
Lupino



Arveja



Demanda por Alimentos de la Acuicultura Nacional (Miles Ton)



Fuente: Echenique y Vidal, 2005

Requirements for Salmon Diets

- High protein content
- Aminoacid balance
- High oil content
 - long chain omega-3 fatty acids
- Oil quality
- High digestibility
- Low content of antinutrients/antifeedants
- GMO-free

Salmon Feed Ingredient Program Activities

Identify opportunitites



Improve offering

- Introduce new cultivars
- Evaluate crops with potential use



Develop new ingredients

- Evaluate processing technologies to improve value and nutritional quality
- Evaluate effects in feeding trials



Promote investment in agroindustrial projects

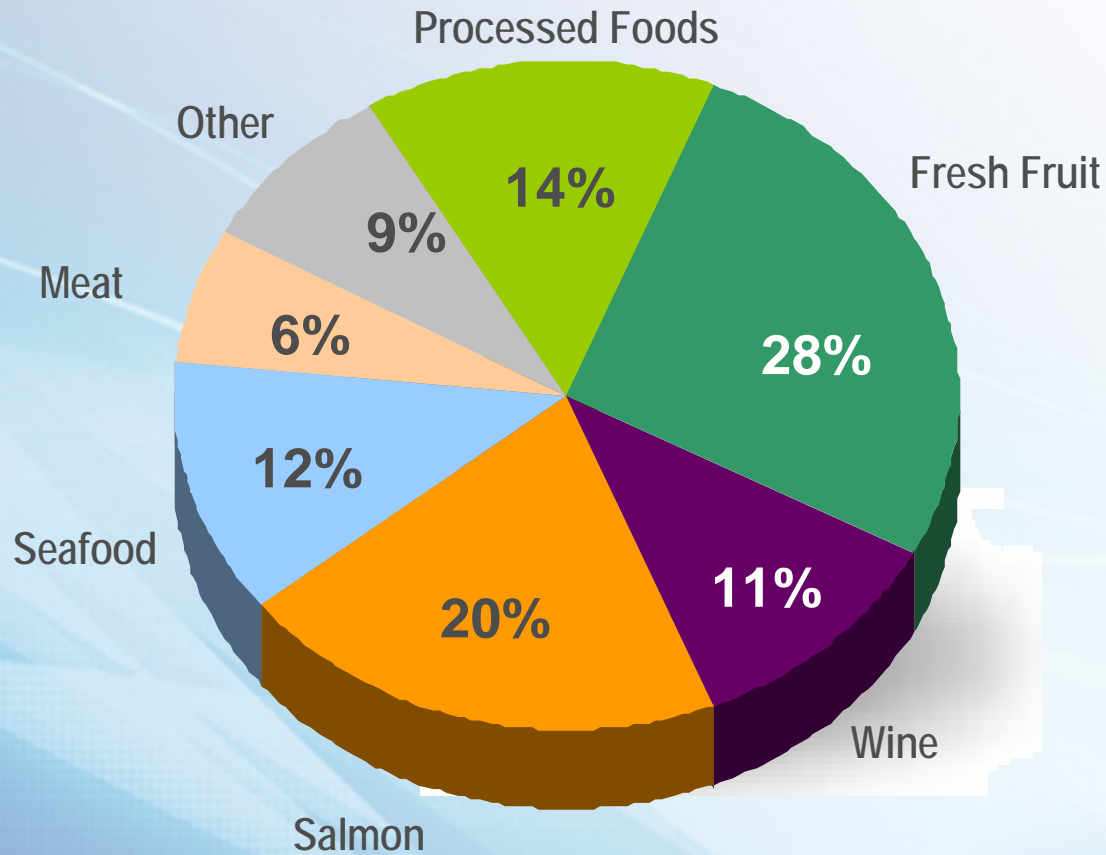
- Feasibility studies of processes and product identified
- Seek technological partners and investors.



Diffusion and transfer of results

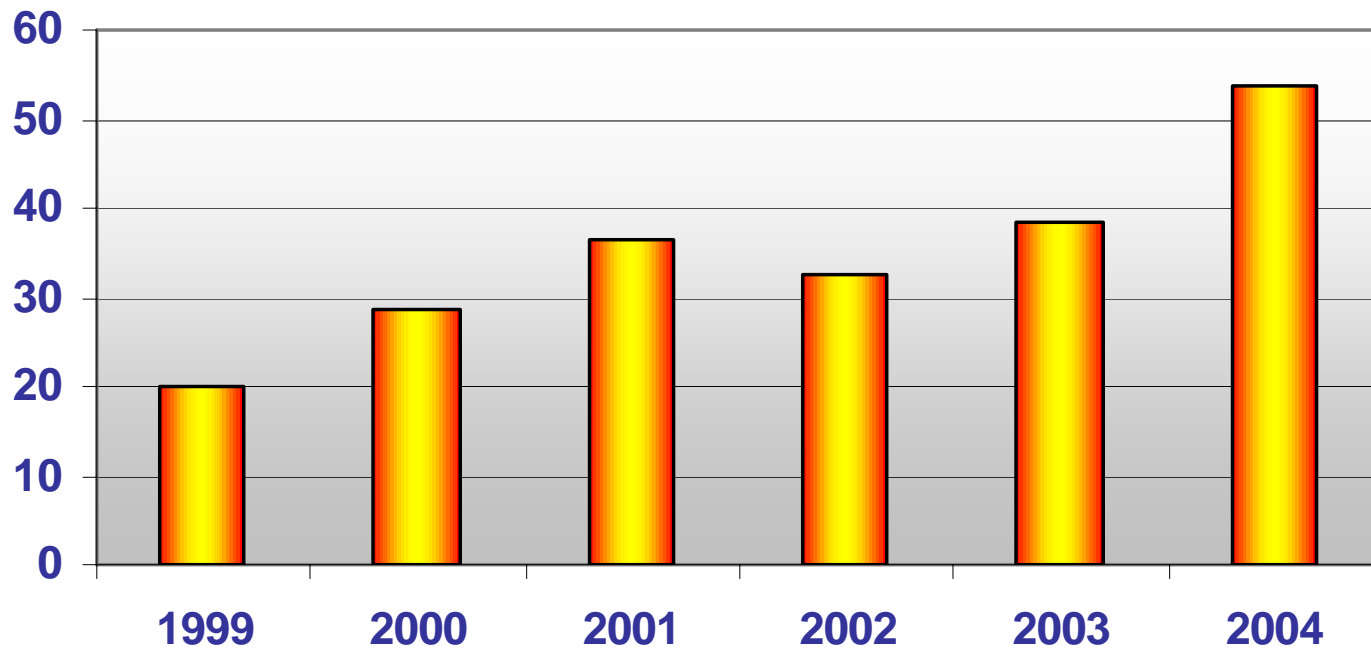
New businesses, Seminars, Field days, Workshops, Publications

Food Exports from Chile



Added Value from Byproducts Opportunities: Culled Fruits

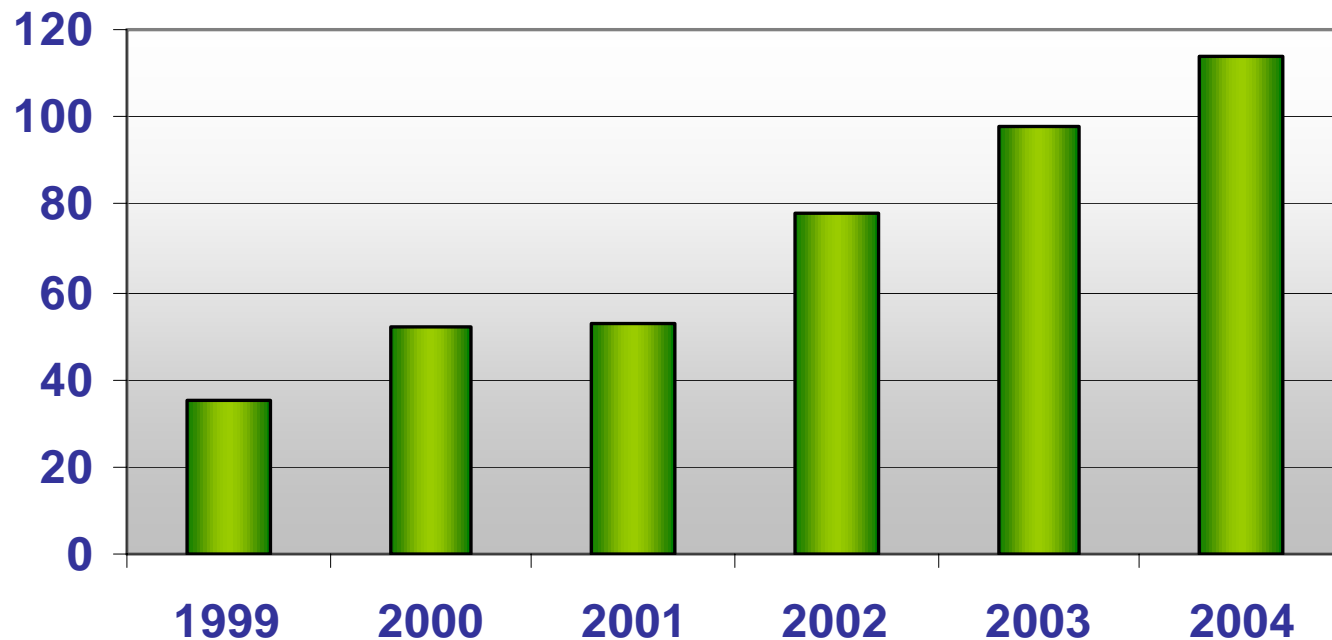
**Citrus fresh exports
(Ton '000)**



Added Value from Byproducts

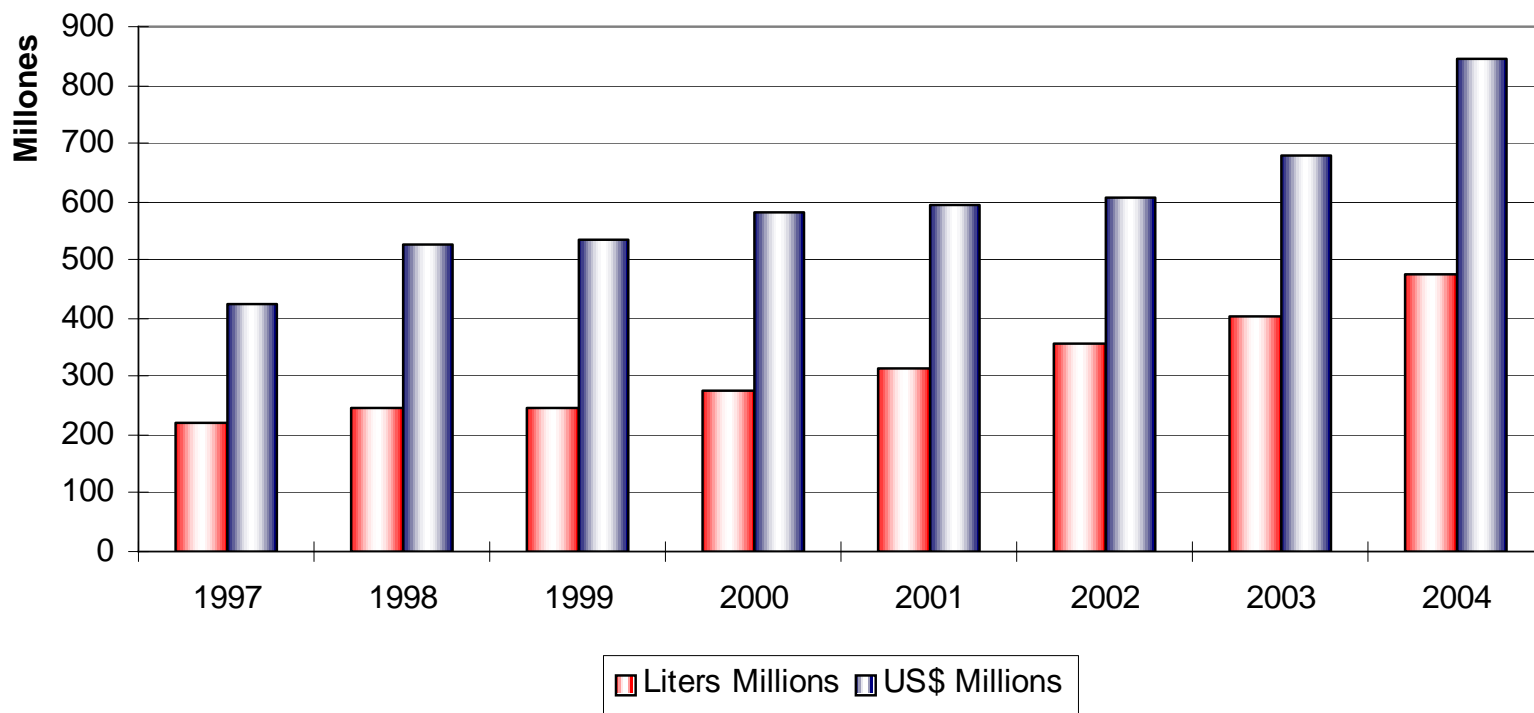
Opportunities: Culled Fruits

**Avocados fresh exports
(Ton '000)**

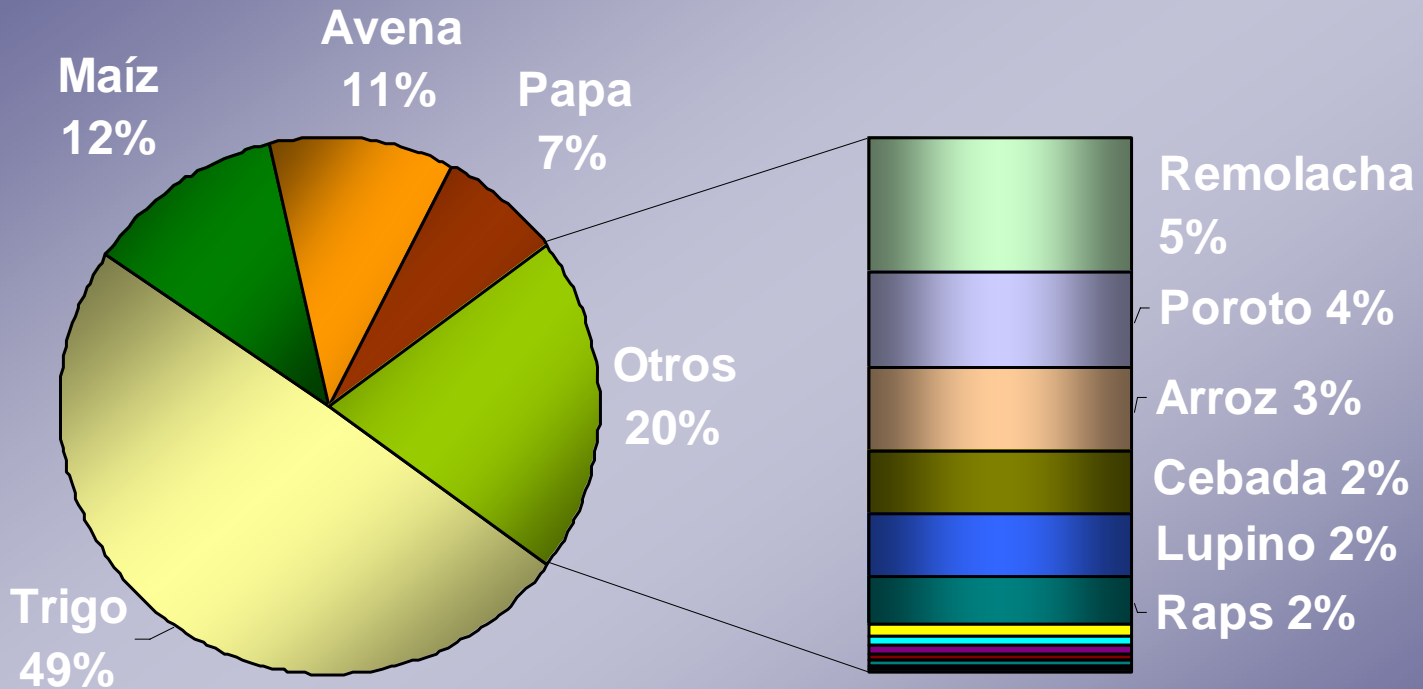


Added Value from Byproducts Opportunities: Wine byproducts

Wines Chilean Exports



Annual Field Crops - Area



100% = 813 Mha

Auctoctonous Species Berries



Murtilla
Ugni molinae
Chilean guava

frutilla chilena
Fragaria chiloensis
Chilean wild strawberry



Auctohtonous Species

Medicinal plants



bailahuén, *Haplopappus baylahuen*
boldo, *Peumus boldus*
canelo, *Drimys winteri*
matico, *Buddleja globosa*
pintoa, *Pintoa chilensis*
patagua, *Crinodendron patagua*
peumo, *Cryptocarya alba*
maqui, *Aristotelia chilensis*



Auctohtonous Species



Quinoa
Chenopodium quinoa

Potatoes
Solanum tuberosum
papas de Chiloe



Algae



Kelp
Duvillaea antarctica
Cochayuyo

Microalgae
Haematococcus pluvialis

