

# **From Land to Laboratory: Sustainable Raw Material Development**



**Chia Wen Chen  
Executive Director of BioActives  
Estée Lauder Companies  
Anti-Aging & Cosmeceuticals Summit  
October 13<sup>th</sup>, 2014**

# Green PC and Cosmetic Products

- No “official” definition
- Green PC and cosmetic products,  
Sustainability and Ethical Consumerism
- Ethical Consumerism: the purchase of a  
product that concerns a certain ethical issue



# 3 Pillars of Sustainability

Environmental

Social  
Responsibility

Human Health





# Categories of Green Cosmetics

- Natural products
- Products with naturally sourced ingredients
- Organic products
- Plant based products





# Thinking “Beyond”

- Think beyond natural or organic
- Consider the environmental impact from conception to end-user and beyond
- Focus on finding the right suppliers who can supply the tools necessary for further improvements



**Green Chemistry** is the design, development and implementation of chemical products and processes to reduce or eliminate the use and generation of hazardous substances to human health and the environment.

- (Anastas P.T., Warner, J.C., Green Chemistry:Theory and Practice, Oxford University Press, NY 1998, p.30; Environmental Protection Agency approved)





# Green Chemistry and Green Engineering Principles

- **Optimize the use of resources**
  - Water, energy, etc.
  - Turn waste into a resource
- **Use Renewable resources**
  - Renewable raw materials
  - Renewable energy
- **Minimize risk**
  - Processing
  - Manufacturing
  - Final products





# Developing Green Raw Materials

- Extraction with water and alcohol instead of organic solvents
- Separation with dialysis instead of column chromatography
- Synthesis with enzymes (Biocatalysis and Biosynthesis) instead of chemical synthesis
- Use of plant tissue cultures and fermentations instead of plant cultivation (esp. for rare and precious species).



# Benefits of Plant Tissue Culture



- An eco-sustainable Green biotech process
- Preserving Biodiversity
- Controlled process, no seasonal variation
- No soil used (soil can be use to cultivate food)
- Reduction of water and solvents used
- Possibility to use rare and precious plants



# Options we have



- **Organic Certification**
- **Harvesting and extraction-** harvest by hand and extract with traditional method, preserving the environment
- **Ethical Wild-crafting** – Harvest healthiest plant and save mature seeds for replanting
- **Land Stewardship** – a process of taking care of earth so we can receive its gift in continuity without degradation.

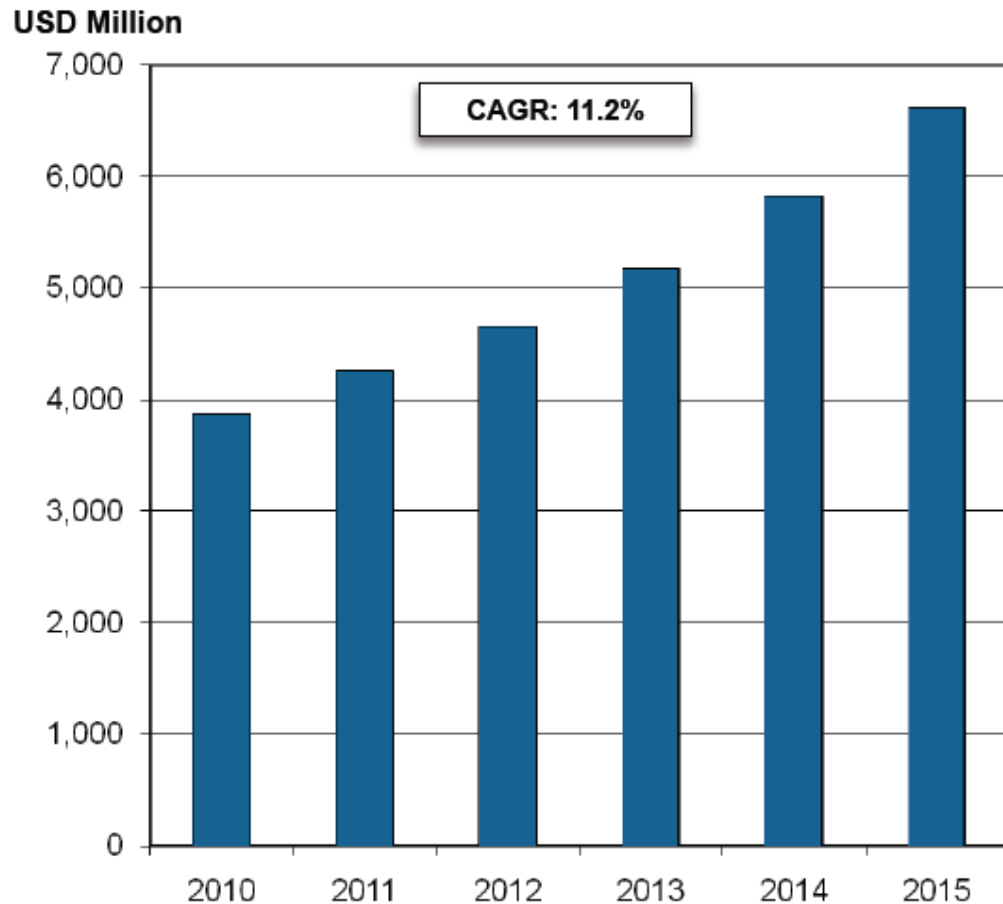


# Green Personal Care and Cosmetics



# The Global Natural Personal Care Market is expected to continue double digit growth in the next five years

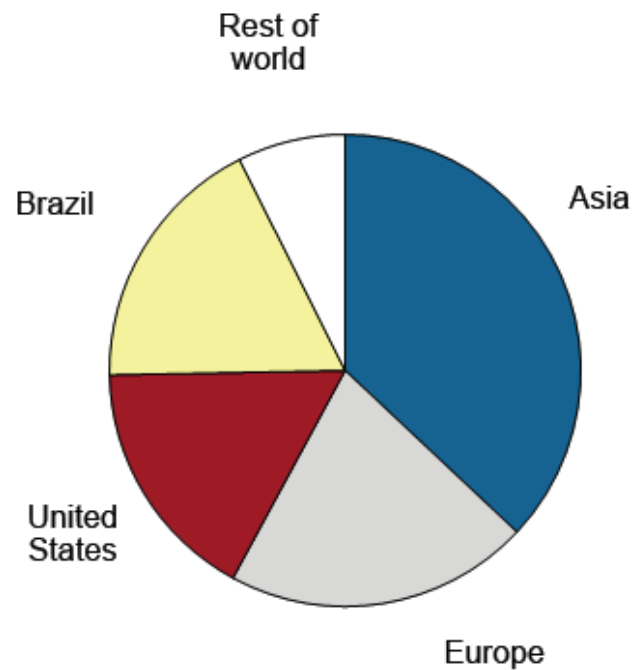
## Natural Personal Care Market Growth



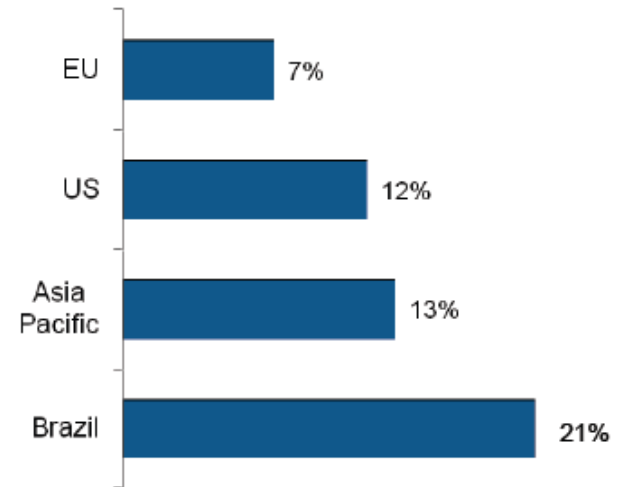
Source: Kline, Note: Includes Mass and Prestige products



## Sales of Natural Personal Care Products by Region, 2010



## Manufacturers' Sales Growth of Natural Personal Care Products by Region 2009-2010





What's involved?



# Chemicals

- Inventory
- Health Impact
- Environmental Impact
- Environmental Fate
- Sustainability



## Potential Relevant Endpoints: Health Impact

- Acute Toxicity
- Ocular Irritation
- Dermal Irritation
- Sensitization
- Neuro activation
- Endocrine Disruption
- Mutagenicity
- Carcinogenicity





## Potential Relevant Endpoints: Environmental Impact

- Total Energy (MJ/kg)
- % Fossil
- GHG Emissions (kg CO<sub>2</sub>/kg)
- Net Water (L/kg)
- Solid Waste (kg waste/kg)
- % Recycled



## Potential Relevant Endpoints: Ecotoxicity

- Acute Aquatic Hazard
- Chronic Aquatic Hazard
- Degradation (% in 28 days)
- Persistence (half life – days)
- Bioaccumulation Potential
- Sludge Partitioning



## Raw Materials

- Chemical Composition
- Processing
- Transport
- Environmental Fate



## Formulas

- Chemical Content
- Processing Energy
- Environmental Fate
- Retrofit vs. New Platforms

Green is not just a trend. It is part of an Evolution. This is the direction where Cosmetic Industry is going. This is the future generation.



Howard! How many times  
do I have to tell you?  
Eat your greens!



*Thank you*