Ο ΧΗΜΙΚΟΣ ΣΤΗ ΒΙΟΜΗΧΑΝΙΑ ΤΩΝ ΚΑΛΛΥΝΤΙΚΩΝ

ΚΩΝΣΤΑΝΤΙΝΟΣ ΓΑΡΔΙΚΗΣ, R&D DIRECTOR, APIVITA

1. Laboratories

Phytochemistry
Biochemistry

APIVITA

RESEARCH

IN-HOUSE LABORATORIES

Phyto & Bio-labs

LABORATORIES

PHYTOLAB

IN HOUSE EXTRACTS CREATION-ASSESSMENT & PRODUCTION

BIOLAB

IN HOUSE EFFICACY TESTS ON HUMAN GENOME

PRESSURIZED LIQUID EXTRACTION

Plant extracts

- Only green and edible solvents
- Reproducibility
- Prevention of oxidation, degradation
- Effective extraction (excellent extraction efficacy for secondary metabolites)
- Minimum energy consumption
- 0 waste process

Current situation

APIVITA has created **>100 in-house extracts** over the years

It is currently producing **52 of those extracts** to an extend of **10 tons per year (2021)**

This represents **70%** of the total extracts consumption (2021)

IN HOUSE SOIL ENHANCER PRODUCTION

Waste management

Process

- Mixing Dry Organic Materials (dry plants, wood chips, saw dust) with the Fresh Organic Matter (whole plants, green grass clippings and leaves) (10d)
- Adding Fresh Plant Material, Biocatalytic, Zeolite and Water (5d)
- Adding Organic wastes (plant waste from extraction operations) (10d)
- Adding Organic wastes (plant waste from extraction operations), Biocatalytic, Zeolite, Nitrogen and Water (~3m)

➢ **Soil Enhancer Production**

- High Quality
- Nitrogen ➡ High Concentration
- Increased soil water holding capacity
- Organic solvents ➡ not detected

LABORATORIES

APIVITA

Biolab

Eco-assessment

Eco-toxicity

Ecotoxicology has been defined as, "the branch of toxicology concerned with the study of toxic effects, caused by natural or synthetic pollutants, to the constituents of ecosystems, animal (including human), vegetable and microbial, in an integral context

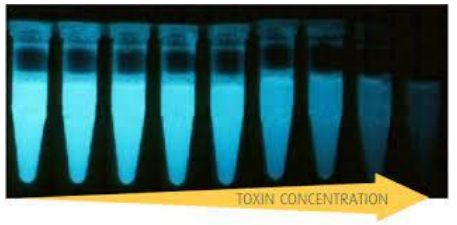
Way to evaluate formulas and ingredients that are environmentally persistent, bioactive, and have the potential for bioaccumulation.

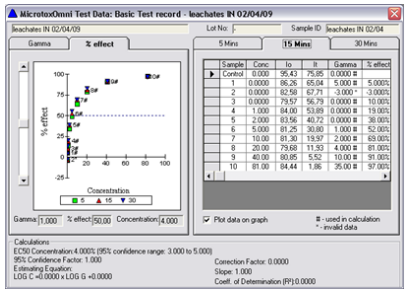
The objective is to evaluate and estimate hazards as a result of personal care products released into the aquatic environment.

- Standardized → different organizations (ISO, OCDE, USEPA, ASTM, etc.)
- Toxicity → acute and chronic.

Vibrio fischeri

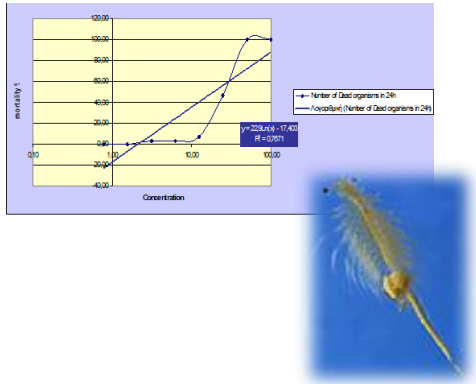
EC50 is the concentration that causes adverse effects in 50% of the test organisms



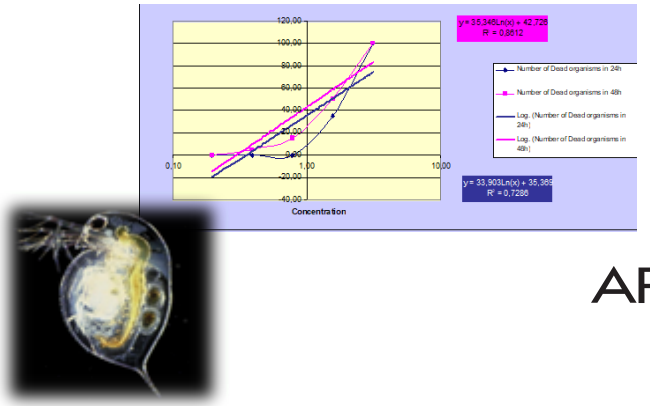


LC50 is the acute toxicity, the lethal concentration at which 50% of the test organism dies within the test-specified time. The test may start with eggs, embryos, or juveniles and last from 24 hours to 96 hours[citation needed]..

Seawater *Artemia franchiscana*



Freshwater *Daphnia magna*



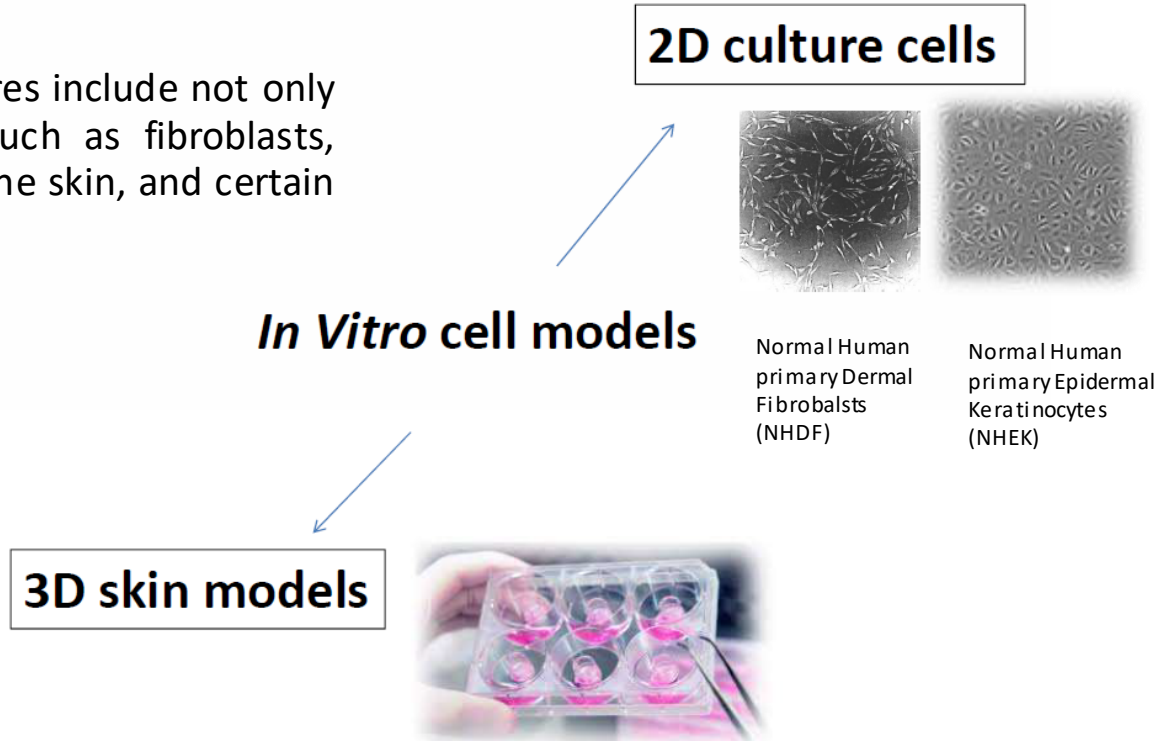
LABORATORIES

APIVITA

Biolab

2D cell cultures and 3D skin models

An alternative to animal testing. These cell cultures include not only keratinocytes but also other skin cell types, such as fibroblasts, which are predominantly in the dermal layer of the skin, and certain immune cells and even melanocytes.



In-house applications:

- ***2D assays***

✓**Safety assessments:** Cell viability, proliferation and metabolism (MTT assay)

✓**Efficacy assessments:** Transcriptomic analysis, protein quantification, wound healing, epigenetics

- ***3D assays***

✓**Skin sensitization: 3d reconstructed human skin Epi-skin**

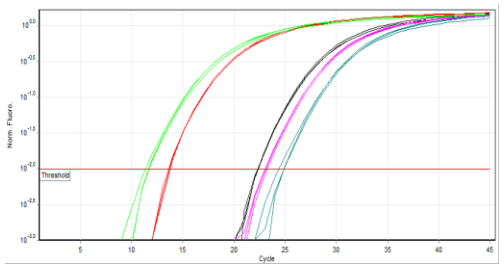
✓**Eye irritation : EpiOcular**

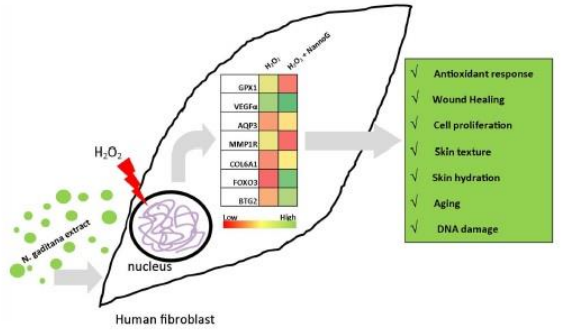
APIVITA

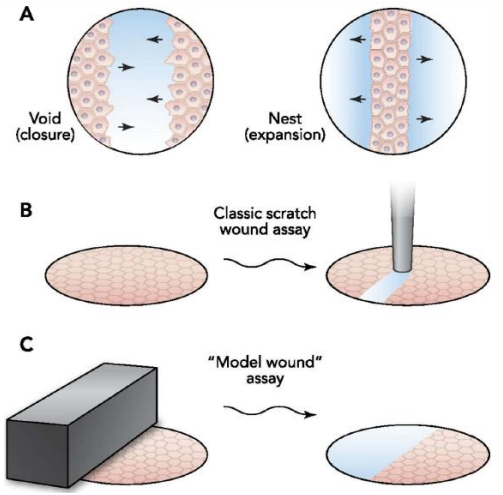
Biolab

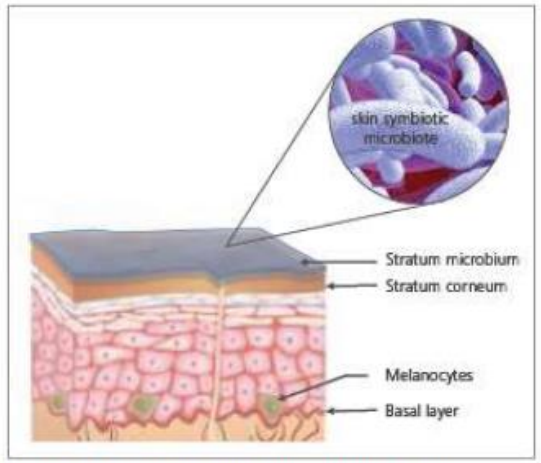
Efficacy Assessments-Proof of efficacy

- Transcriptomic profiling method: detection of expression **200 genes** involved in skin related processes (**APIGENES** platform)
- **Epigenetics** : methylation process, detection of miRNAs related to aging
- **Protein Biochemistry** assays to further validate the genomic data in the **post-transcriptional level**
- **Metagenomics :** target skin microbiome - effect on stratum microbium
- **In vitro migration** assays in 2D cell cultures to study the **wound healing** effect of tested extracts









Fitz-Gibbon et al., Journal of Investigating Dermatology,2013

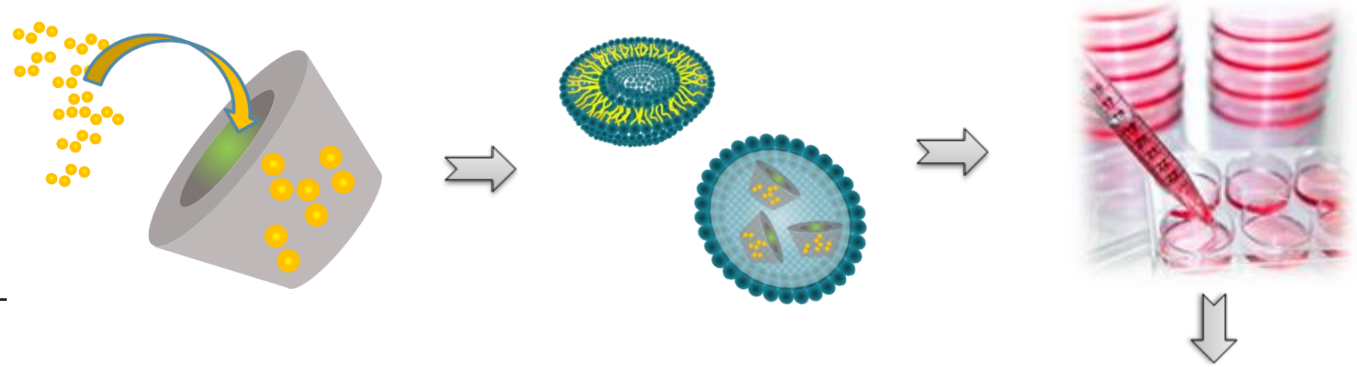
Biolab

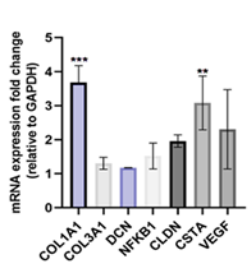
Royal Jelly Controlled Release

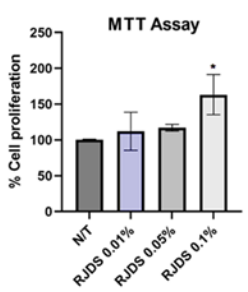
Protects fibroblasts and ECM by enhancing **collagen production, cell contractility** (Col1A1, CSTA)

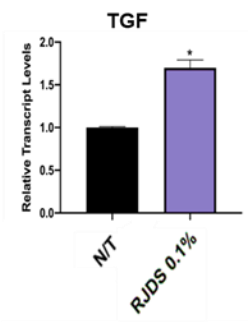
Promotes **cell proliferation, cell viability and metabolism** in human fibroblasts (MTT assay, TGF, MNF2)

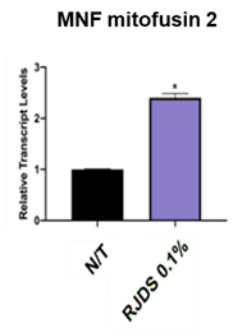
Protects fibroblasts from **aging** process (mir129- Epigenetic biomarker)

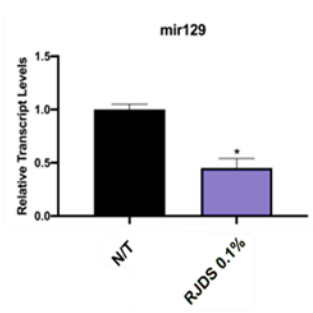




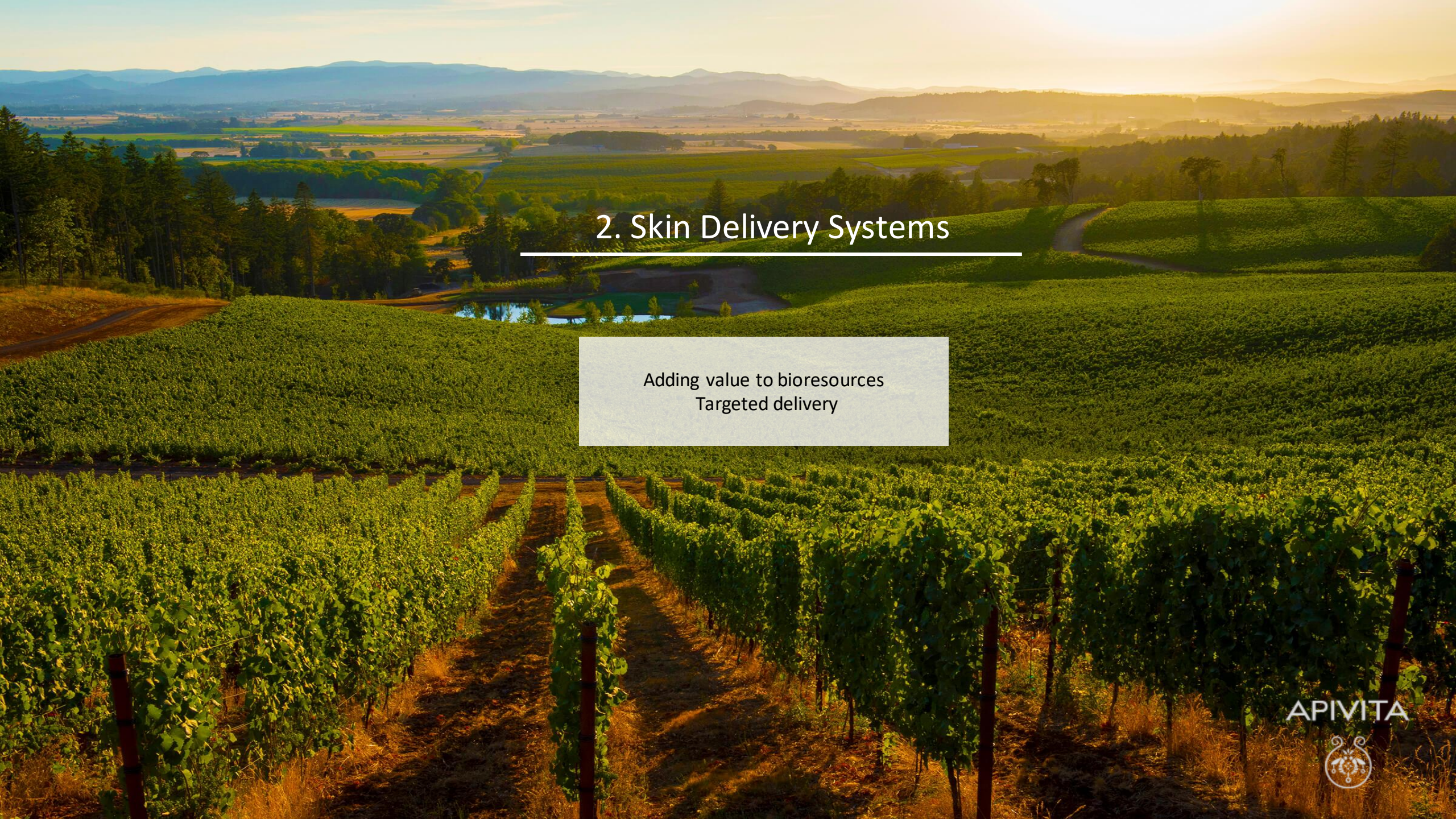








APIVITA



2. Skin Delivery Systems

Adding value to bioresources
Targeted delivery

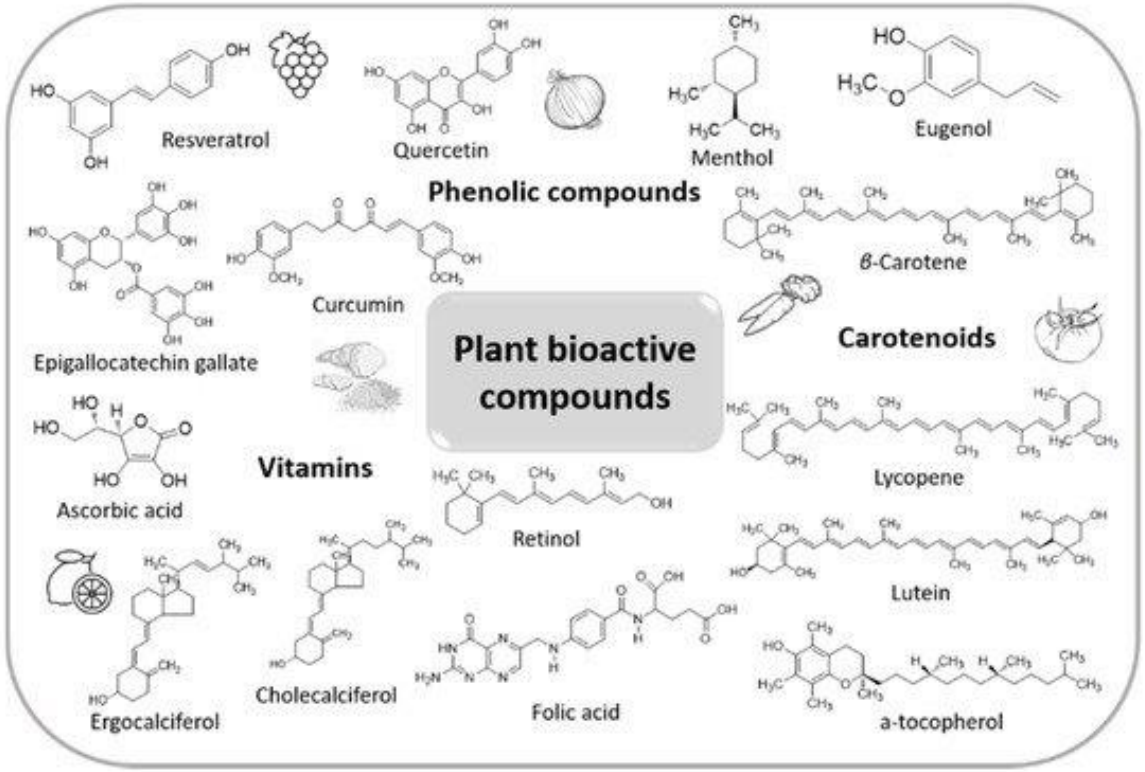
APIVITA

INNOVATION

Representative classes of plant-derived bioactive compounds

Challenges in the Use of Natural Products

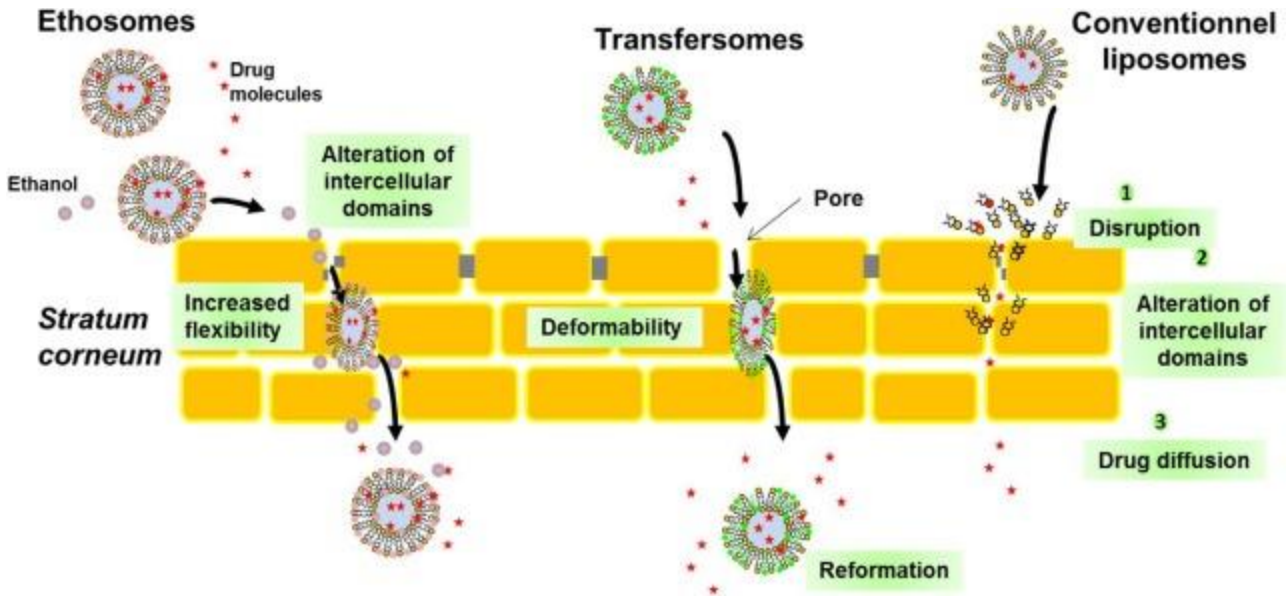
- Solubility
- Stability
- Bioavailability
- Release rate

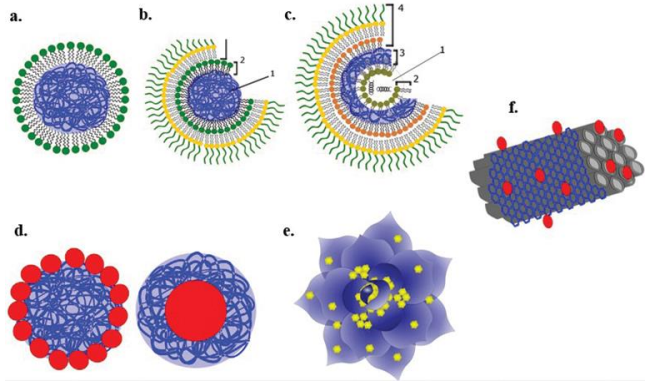


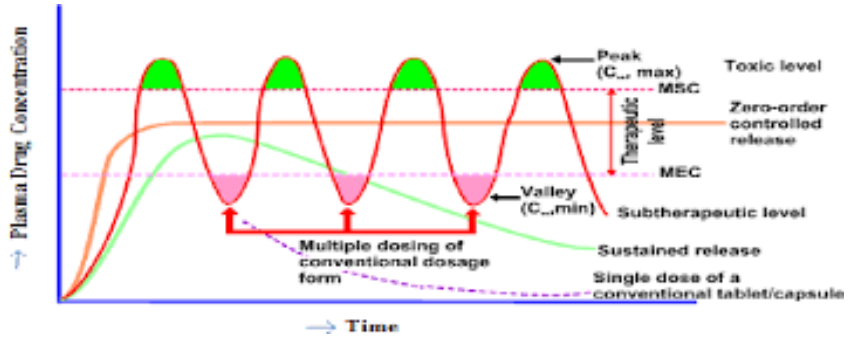
Kyriakoudi A, Spanidi E, Mourtzinos I, Gardikis K. Innovative Delivery Systems Loaded with Plant Bioactive Ingredients: Formulation Approaches and Applications. *Plants*. 2021; 10(6):1238

Combinatorial systems

Skin penetration/Release rate

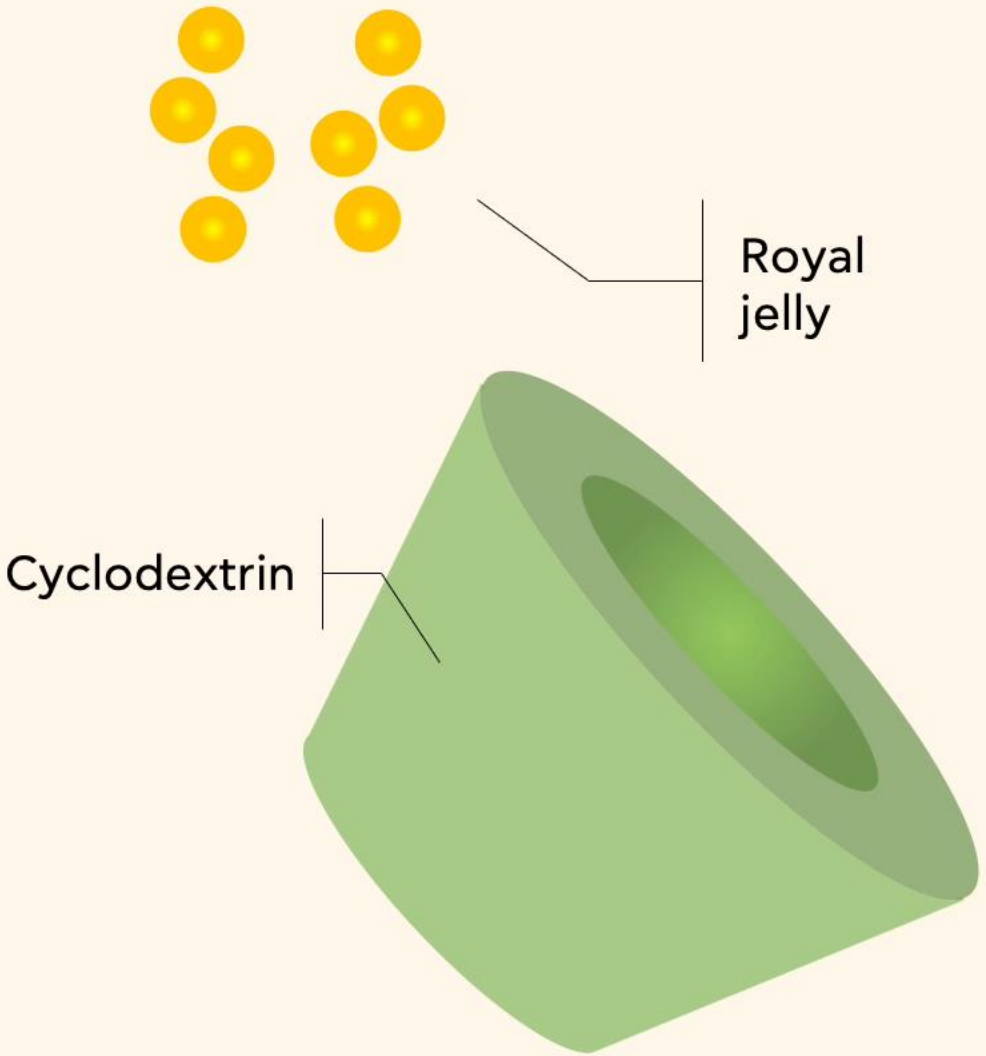






M. Sala, R. Diab, A. Elaissari, H. Fessi, Lipid nanocarriers as skin drug delivery systems: Properties, mechanisms of skin interactions and medical applications, International Journal of Pharmaceutics, Volume 535, Issues 1–2, 2018, Pages 1-17
Madni, A. et al., 2017, 'Hybrid Nano-carriers for Potential Drug Delivery', in S. Maiti, K. K. Sen (eds.), Advanced Technology for Delivering Therapeutics, IntechOpen, London. 10.5772/66466.

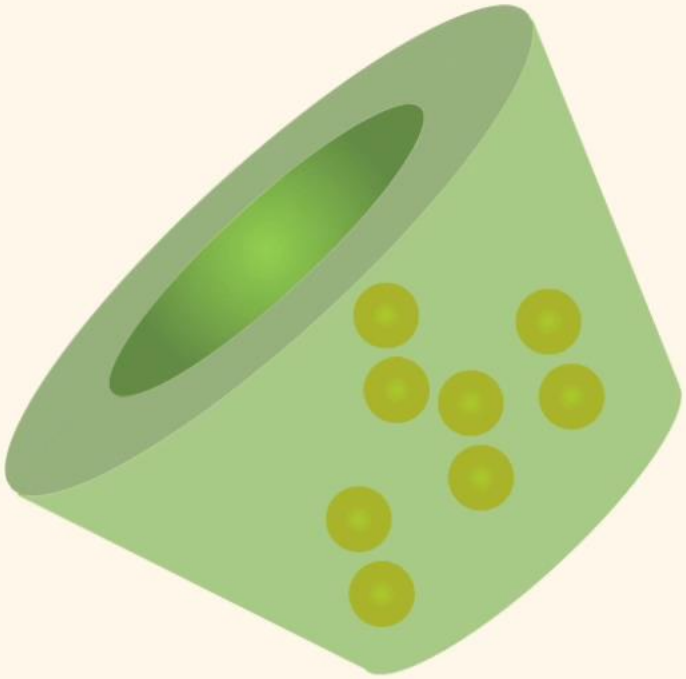
HYBRID NATURAL CARRIER



PHASE 1:

Royal jelly is encapsulated inside a cyclodextrin for maximum protection

HYBRID NATURAL CARRIER



PHASE 2:

The cyclodextrin containing the royal jelly is in turn encapsulated in the core of a liposome

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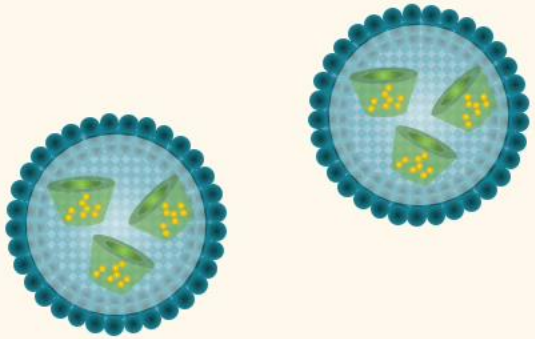


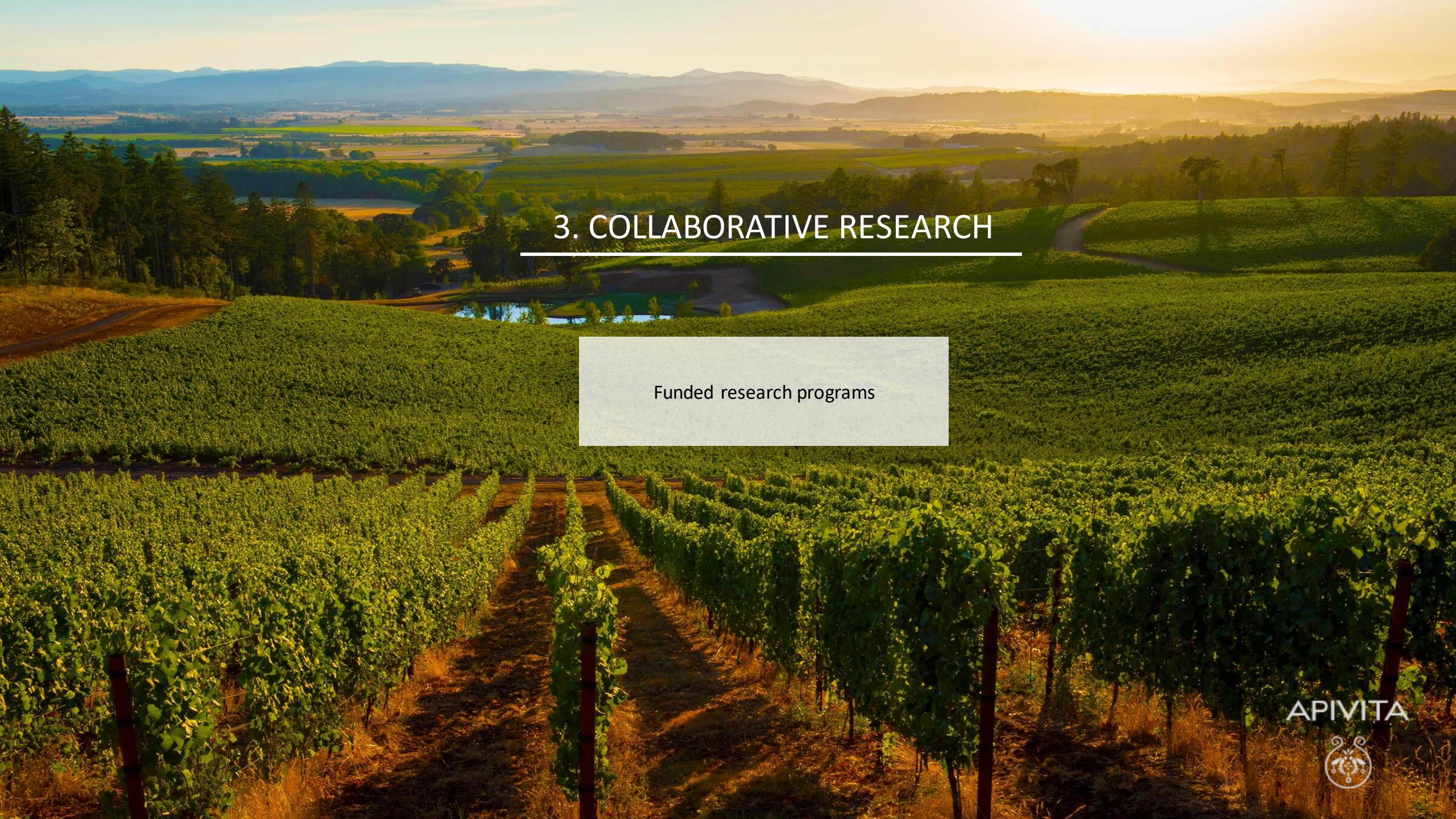
HYBRID NATURAL CARRIER

PHASE 3:

Deep & time controlled release

Bioactivity of royal jelly offered to skin in a time-controlled way for maximum absorption and efficacy

APIVITA



3. COLLABORATIVE RESEARCH

Funded research programs

APIVITA

Greentech expertise

RESEARCH PROGRAMS

HORIZON 2020

EthnoHERBS

Tascmar

Marisurf

algae4a-b

- ✓ 16 accomplished Research Programs
- ✓ 16 M euro budget
- ✓ 12 Established lab methods
- ✓ 7 products on market
- ✓ 2 innovative products pending
- ✓ 78 collaborating institutes/universities

Long-term research collaborations

Four “2020 horizon” international research programs

UNIVERSITIES PARTNERSHIPS

FRENCH National Centre for Scientific Research

CCMAR CENTRE OF MARINE SCIENCES

TEL AVIV UNIVERSITY

HERIOT WATT UNIVERSITY

IFAPA JUNTA DE ANDALUCIA

University of ULSTER

UNIVERSITÉ DE LA RÉUNION S'ouvrir aux mondes

Prestigious partnerships with international Academia

Active collaborations with
25 countries around the world

4. FORMULATION

Innovative effective final products

APIVITA

PRODUCT DEVELOPMENT PHILOSOPHY

We provide the most effective solution for skin's well being following all intrinsic and restoring mechanisms

- Unlock all mechanisms for skin's best function
- Maximize the inner possibilities for flawless skin

Health and beauty are indispensably connected

- Cutting edge technologies to unblock and enhance skin's role to health

We seek optimum balance between maximum results and green+clean formulations

- Effective ingredients that have been selected according to their sustainability and clean profile

Formulation is driven by sophisticated simplicity

- All included ingredients have a very special synergistic mission to deliver in the formula

Development

CLEAN FORMULATION CHARTER

NATURAL

SAFE

EFFECTIVE

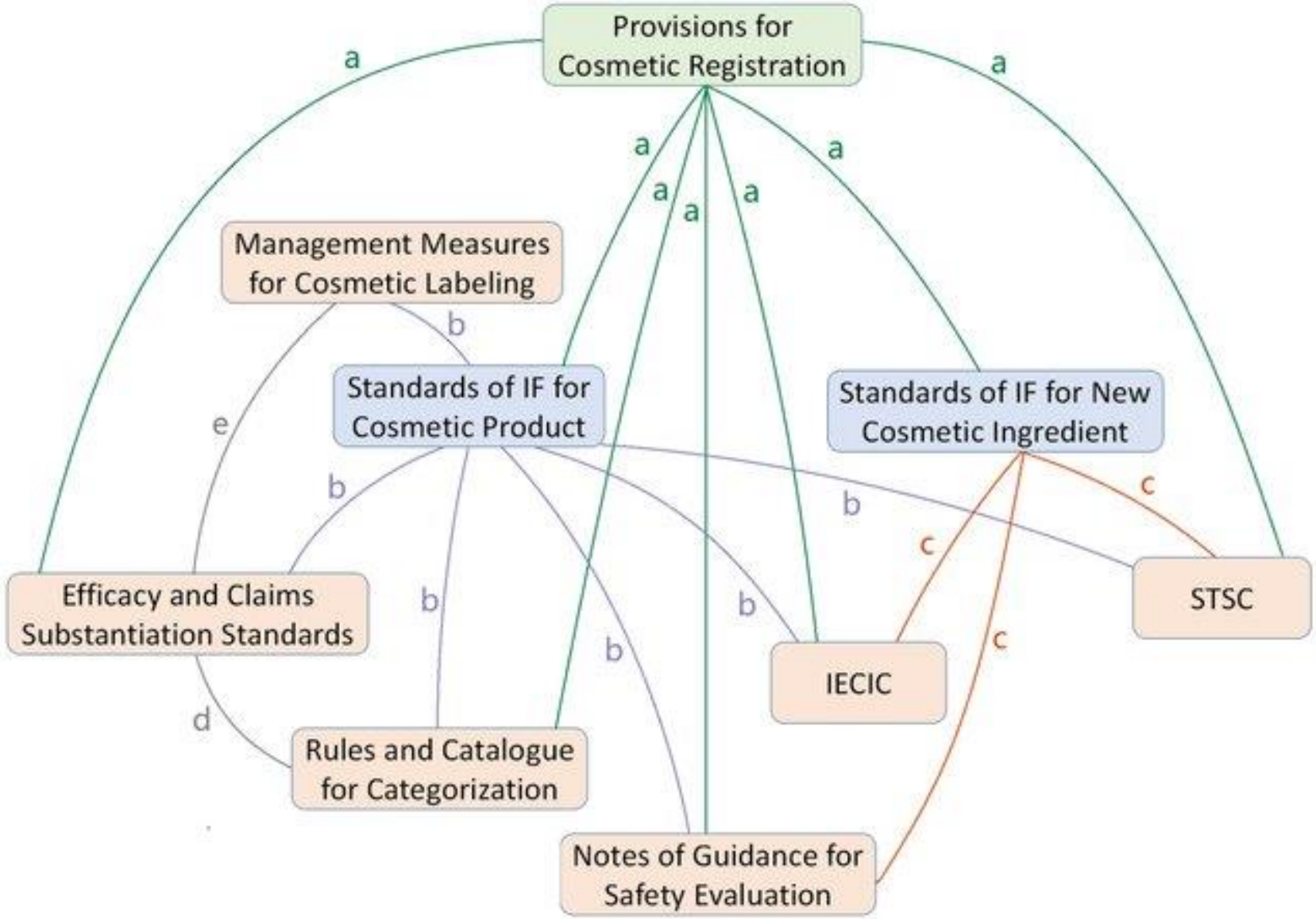
SUSTAINABLE

APIVITA

5. REGULATORY

Legal consolidation of portfolio

APIVITA


Provisions for Cosmetic Registration
Management Measures for Cosmetic Labeling
Standards of IF for Cosmetic Product
Standards of IF for New Cosmetic Ingredient
Efficacy and Claims Substantiation Standards
Rules and Catalogue for Categorization
IECIC
STSC
Notes of Guidance for Safety Evaluation
a
b
c
d
e

6. SCIENCE COMMUNICATION

Dissemination of scientific expertise

APIVITA

A tool for brand marketing

Recognition

Scientific communication

SCI COM

- Keynote speakers in global leading scientific conferences
- Publications in peer-reviewed scientific journals with impact factor
- TV, radio, newspaper, social media communication of APIVITA scientific excellence linked with product launches
- Scientific presentation of innovation during product launches events
- Organization of innovation days, workshops, summer schools aiming at the brand's scientific image reinforcement

plants

MDPI

Review

Innovative Delivery Systems Loaded with Plant Bioactive Ingredients: Formulation Approaches and Applications

Anastasia Kyriakoudi [1], Eleni Spanidi [2], Ioannis Mourtzinos [1] and Konstantinos Gardikis [2,*]

[1] Laboratory of Food Chemistry and Biochemistry, Department of Food Science and Technology, Faculty of Agriculture, Aristotle University of Thessaloniki, 54124 Thessaloniki, Greece; ankyria@chem.auth.gr (A.K.); mourtzinos@agro.auth.gr (I.M.)
[2] APIVITA SA, Industrial Park, Markopoulo, 19003 Athens, Greece; spanidi-e@apivita.com
* Correspondence: gardikis-k@apivita.com

antioxidants

MDPI

Article

Honey Extracts Exhibit Cytoprotective Properties against UVB-Induced Photodamage in Human Experimental Skin Models

Athanasios Karapetsas [1], Georgia-Persephoni Voulgaridou [1], Dimitra Iliadi [1], Ilias Tsochantaridis [1], Panagiota Michail [1], Spyridon Kynigopoulos [2], Maria Laml Maria-Ioanna Stavropoulou [3], Konstantina Stathopoulou [3], Sofia Karabournioti [4], Nektarios Aligiannis [3], Konstantinos Gardikis [5], Alex Galanis [1], Mihalis I. Panayi Aglaia Pappa [1,*]

ELSEVIER

The Journal of Supercritical Fluids

Volume 146, April 2019, Pages 159-164

Supercritical CO_2 extraction of *Salvia fruticosa*

Daphne Kavoura [a], Konstantina Kyriakopoulou [b], Georgios Papaefstathiou [c], Eleni Spanidi [d], Konstantinos Gardikis [d], Vasiliki Louli [a] ✉, Nektarios Aligiannis [c], Magdalini Krokida [b], Konstantinos Magoulas [a]

Int J Appl Biol Pharm 2020; 11 (4): 276-278

fortune journals open access

Short Commentary

Photoprotective Properties of Honey Extracts and their Correlation with the Metabolomic Content

Konstantinos Gardikis

APIVITA SA, Industrial Park of Markopoulo Mesogaias, 19003 Markopoulo Attiki, Athens, Greece

Scientific Research Publishing

Advances in Entomology, 2017, 5, 68-74
http://www.scirp.org/journal/ae
ISSN Online: 2331-2017
ISSN Print: 2331-1991

Comparison of Traps Collecting Propolis by Honey Bees

Antonios E. Tsagkarakis[1*], Tatiani Katsikogianni[2], Konstantinos Gardikis[2], Ioannis Katsenios[2], Eleni Spanidi[2], Georgios N. Balotis[3]

plants

MDPI

Article

A New Controlled Release System for Propolis Polyphenols and Its Biochemical Activity for Skin Applications

Eleni Spanidi [1], Athanasios Karapetsas [2], Georgia-Persephoni Voulgaridou [2], Sophia Letsiou [1], Nektarios Aligiannis [3], Ilias Tsochantaridis [2], Spyridon Kynigopoulos [4], Maria Lambropoulou [4], Ioannis Mourtzinos [5], Aglaia Pappa [2] and Konstantinos Gardikis [1,*]

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and Natural Products Chemistry, Faculty of Pharmacy, National and
ens, Panepistimiopolis Zografou, 11527 Athens, Greece;

nbryology, Faculty of Health Sciences, School of Medicine,
e, 68100 Alexandroupolis, Greece; spyroskinigopoulos@hotmail.com (S.K.);

d Technology, Faculty of Agriculture, Aristotle University of Thessaloniki,
urtzinos@agro.auth.gr
pivita.com; Tel.: +30-6974899959

antioxidants

MDPI

Article

Propolis Extracts Inhibit UV-Induced Photodamage in Human Experimental In Vitro Skin Models

Athanasios Karapetsas [1,†], Georgia-Persephoni Voulgaridou [1,†], Manolis Konialis [1], Ilias Tsochantaridis [1], Spyridon Kynigopoulos [2], Maria Lambropoulou [2], Maria-Ioanna Stavropoulou [3], Konstantina Stathopoulou [3], Nektarios Aligiannis [3], Petros Bozidis [4], Anna Goussia [4], Konstantinos Gardikis [5], Mihalis I. Panayiotidis [6] and Aglaia Pappa [1,*]

[1] Department of Molecular Biology & Genetics, Democritus University of Thrace, 68100 Alexandroupolis, Greece; karapetsas_than@yahoo.gr (A.K.); georgiavou_85@hotmail.com (G.-P.V.); manolis_konialis@yahoo.gr (M.K.); iliatsoc@gmail.com (I.T.)
[2] Laboratory of Histology & Embryology, School of Medicine, Faculty of Health Sciences, Democritus University of Thrace, 68100 Alexandroupolis, Greece; spyroskinigopoulos@hotmail.com (S.K.); mlambro@med.duth.gr (M.L.)
[3] Department of Pharmacy, Division of Pharmocognosy & Natural Products Chemistry, National and Kapodistrian University of Athens, 15771 Athens, Greece; mstavropoul@yahoo.gr (M.-I.S.);

)02/cbdv.201900146

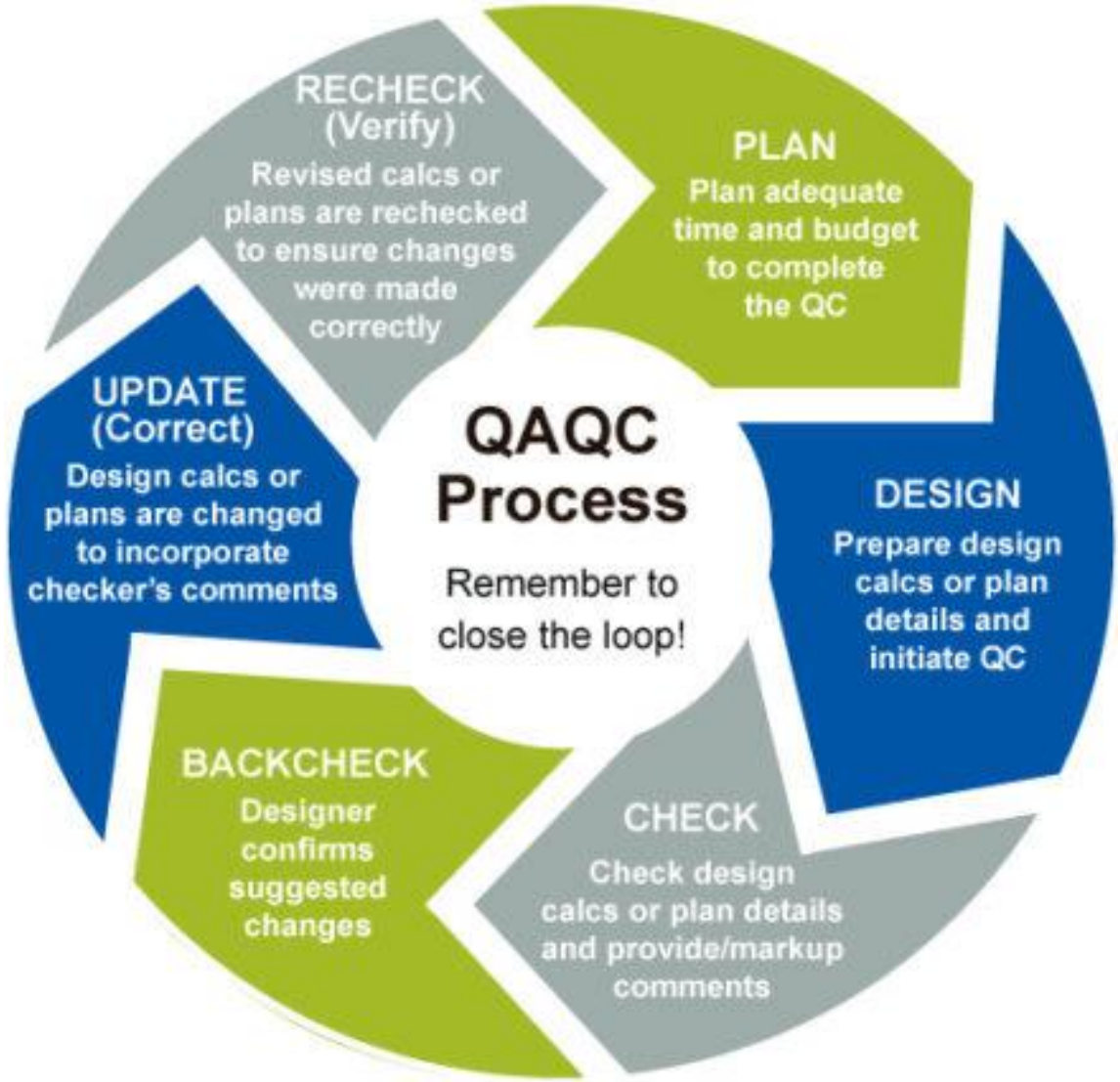
FULL PAPER

CHEMISTRY & BIODIVERSITY

ıotometric Analysis of Propolis from the Island of Samothraki, Greece. The Discovery of Red Propolis

ıdros Papachristoforou,[*a, b] Evgenia Kotouvela,[c] George Menexes,[d] Konstantinos Gardikis,[e] and Ioannis Mourtzinos[f]

Essentials Of A Cosmetics Business Plan



APIVITA

ΕΥΧΑΡΙΣΤΩ!