Bio-processing of fruits

especially Seabuckthorn berries

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The request for reproducible standardized half-finished and finished products,

started with the 1st ISA conference 2003 in Berlin,

has not been yet successfully completed.

The focus was to utilize the “fruit-own“, bioactive dynamics of the Seabuckthorn throughout the all processing steps.

This is still missing the acceptance of the industry.

What is bio-technology?

What do we want to achieve with it?

Searching the word

Bio-technology

in a dictionary
delivers:

"use of productive services of cell groups, fungi in a controlled environment"

It does not concern the use of any natural raw material like grapes or milk.

We use lactic acid bacteria for acidification of milk and yeast strains for alcoholic fermentation of grape mash.

Spontaneously and naturally initiated degradation of natural compounds is prevented and redirected into a productive process.

For a top quality end-product the entire process from the raw material until the final consumption by the consumer has to be validated as a closed entity.

The German doyen of wine technology, Gerhard Troost wrote 1955 in his textbook:

"A good winemaker must be also a qualified vineyard manager, as the quality of the wine is determined primarily in the vineyard".

The basic principles apply to every organic product. In any case, the initial product quality and the impact on quality during storage and processing must be well known and considered.

Every Seabuckthorn product, whether from the lipid – or from the juice/pulp has a strong organoleptic character, which reflects the technological processing ability of the producer.

When the sensoric attributes result in a declaration explained by the English expression "buck", the bio-processing was insufficient.

Both kinds of products coming from the pulp-oil or the skimmed juices, must be fruity without any impure smell and taste.

Smell and taste indicate as well the healing abilities of the different Seabuckthorn products. The products from oil seemed to be more powerful than the ones from pulp or juice.

<u>This is NOT correct.</u>

Watch-out the RPF-values!

The need to use all compounds of Seabuckthorn berries was pointed out before, but also essential is the separation of oil and juice.

Why?

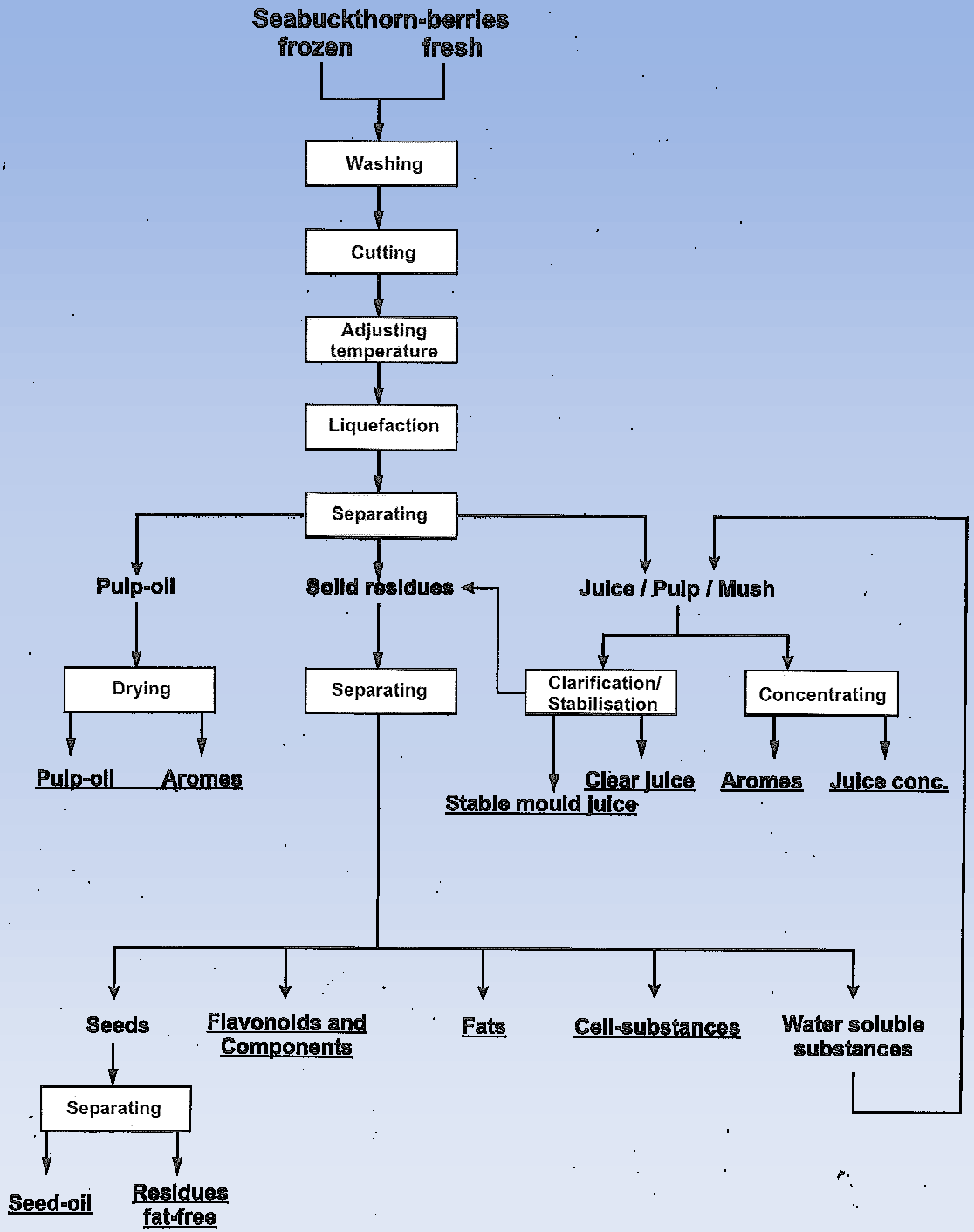
The mechanism and chemistry of the Seabuckthorn-berry and the human-being are quite different.

We have to adapt the natural properties of the Seabuckthorn-berry to the demands of the human-being.

The processor, the scientist for biotechnology has to respect without compromise the given properties of the raw material and its origin.

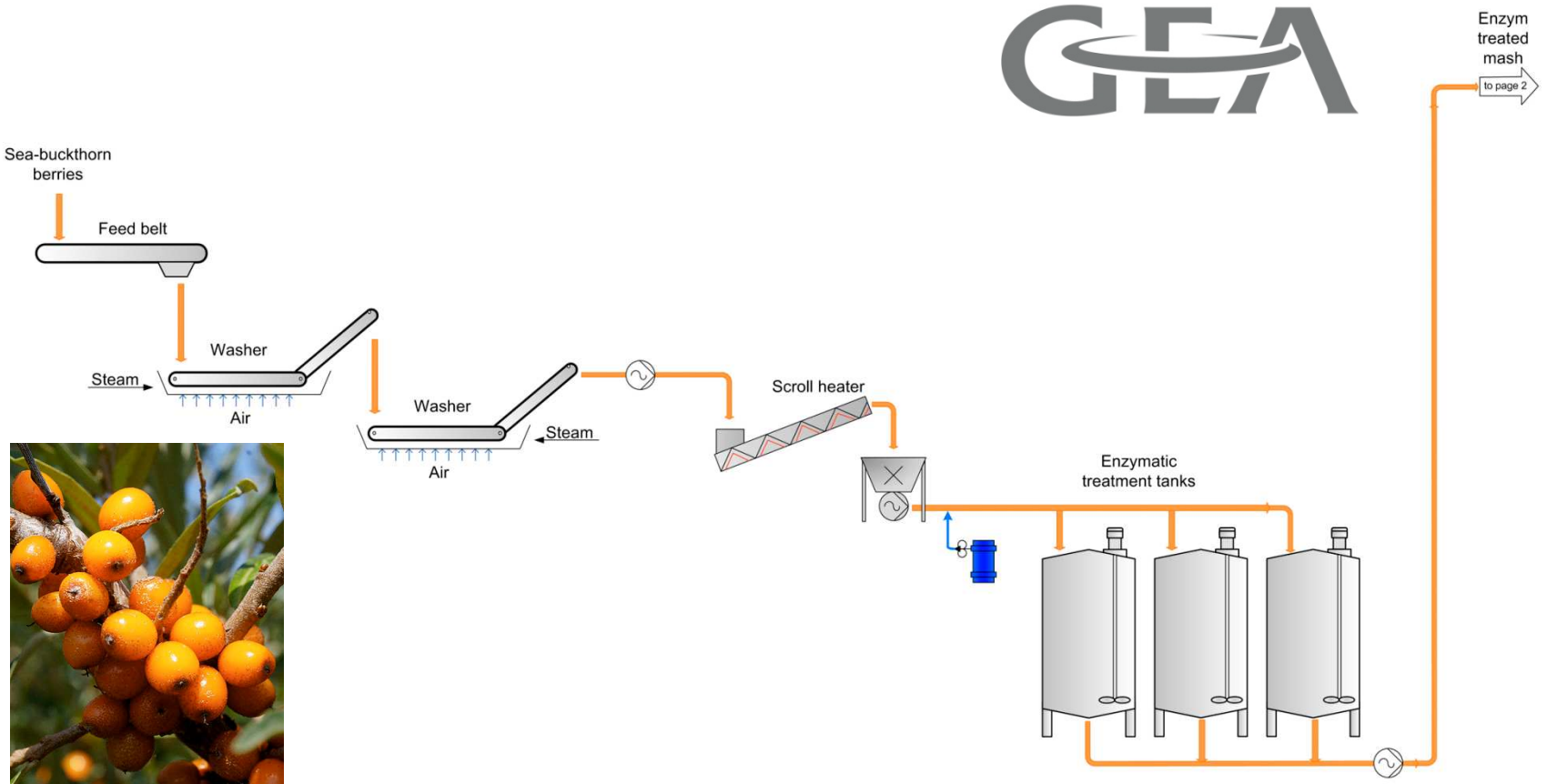
How?

The procedure of “Waste-free-bio-processing” is shown schematically in the following flow chart.

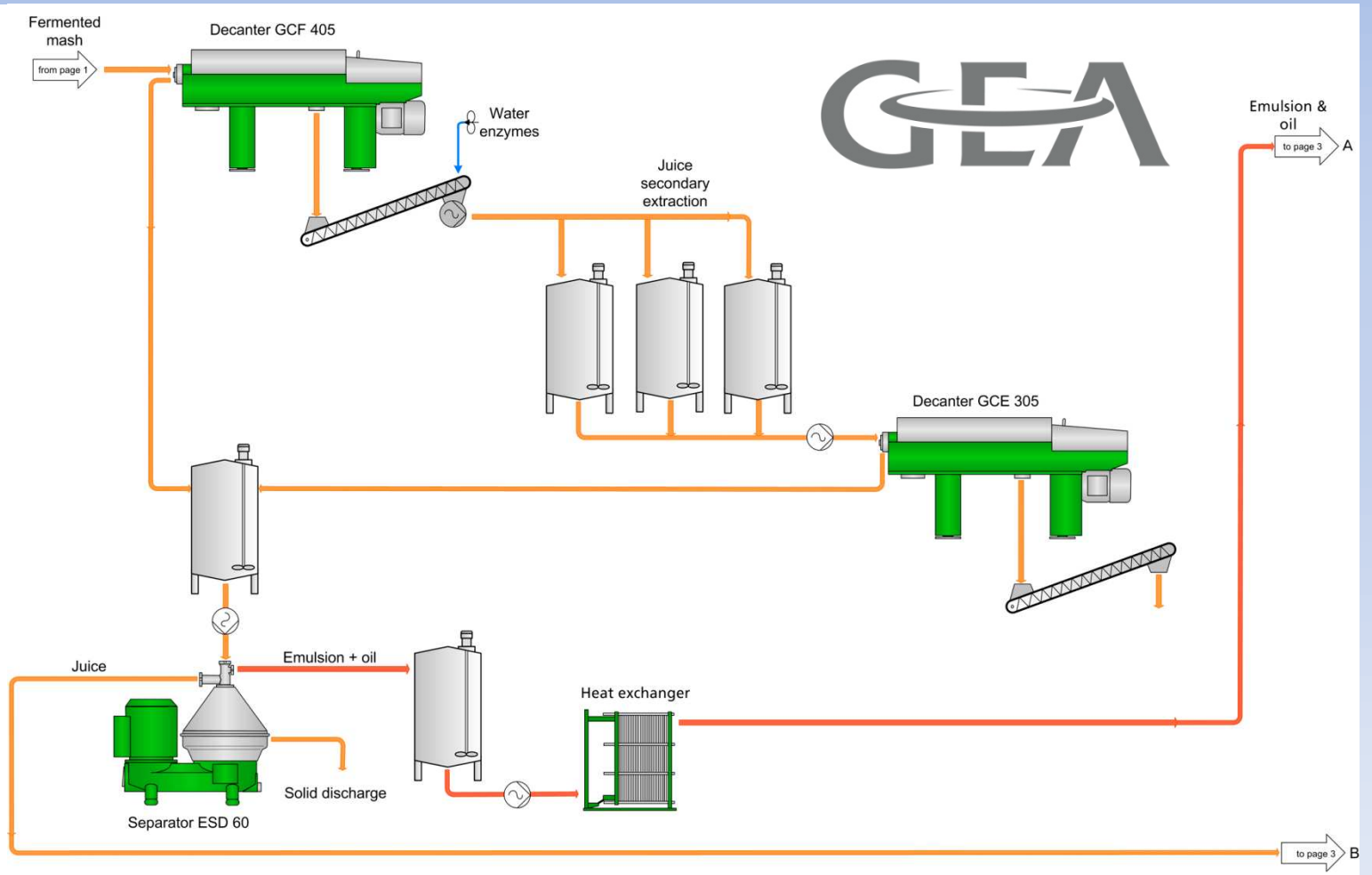

Seabuckthorn-berries
frozen
fresh
Washing
Cutting
Adjusting temperature
Liquefaction
Separating
Pulp-oil
Solid residues
Juice / Pulp / Mush
Drying
Separating
Clarification/ Stabilisation
Concentrating
Pulp-oil
Aromes
Stable mould juice
Clear juice
Aromes
Juice conc.
Seeds
Flavonoids and Components
Fats
Cell-substances
Water soluble substances
Separating
Seed-oil
Residues fat-free

Main features of a technical solution,
<u>the processing line,</u>
you can see on the following slides.

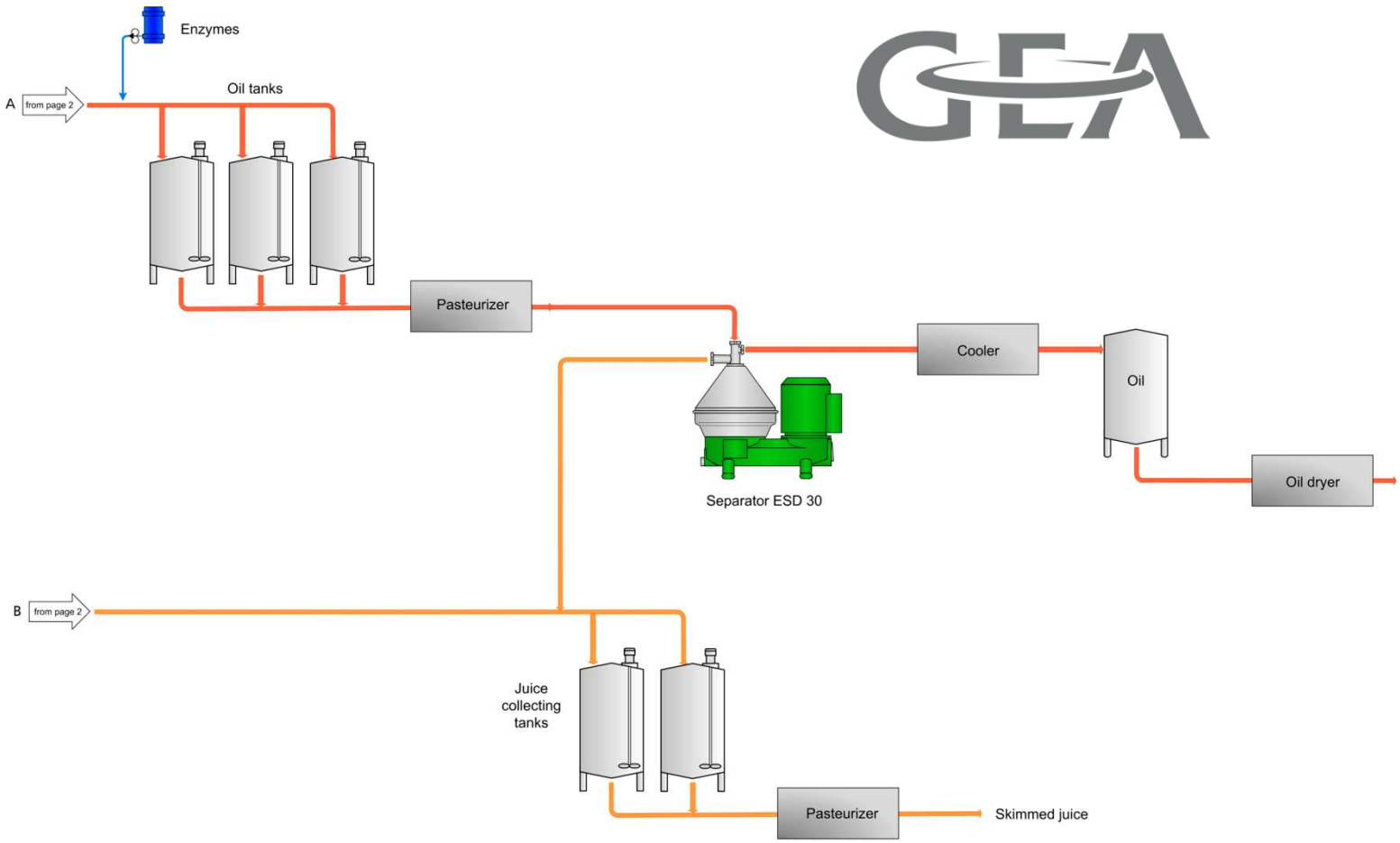
The right raw material AND the right mash preparation are the key for the downstream process and the final product quality.



Fast & gentle separation of the liquid and solid phase in an inert gas atmosphere eliminates the oxigen and protect the product.



The efficient separation of oil and juice are mandatory for a stable quality and longer shelf life.



The process itself is well known.

But how has the quality management to be executed for the production and the final product?

The classical comparative method of measurement: The content of single valuable constituents is measured and compared before, during and after processing.

This classical method is still valid but insufficient.

There are beneficial abilities similar like the RPF-value recognized, which can not be characterized by a single chemical compound.
But still this have to be considered and described in the one or the other way.

Quality management according to the actual bio-technology meets these requirements, the classical measurement method does not. Physical-chemical methods detect the abilities in a different way and not only by detecting single compounds.

The bio-technological abilities have to be considered as an overall entity in ist own, as we are consuming the whole fruit/berry as well.

They are in strict adherence to the above objectives, apart of already highlighted criteria of degustation like:

- **Viscosity**
- **Ranzemat-value**
- **RPF-value**

The large spectrum of healing abilities of Seabuckthorn products must be reflected in the analyzing methods.

The wide range of ingredients can explain the in East Asia well known pharmaceutical effects generated by the Seabuckthorn.

Among the variety of methods the most important is the analysis of antioxidants with the

Radical Protection Factor (RPF),

determining the scavenging capacity of free radicals.

Definition and measurement:

The Radical Protection Factor (RPF) determines the scavenging activity of an antioxidant against a test substance.

This test substance consists of a very reactive semi-stable radical which reacts with all known antioxidants.

evaluation of
Antioxidants

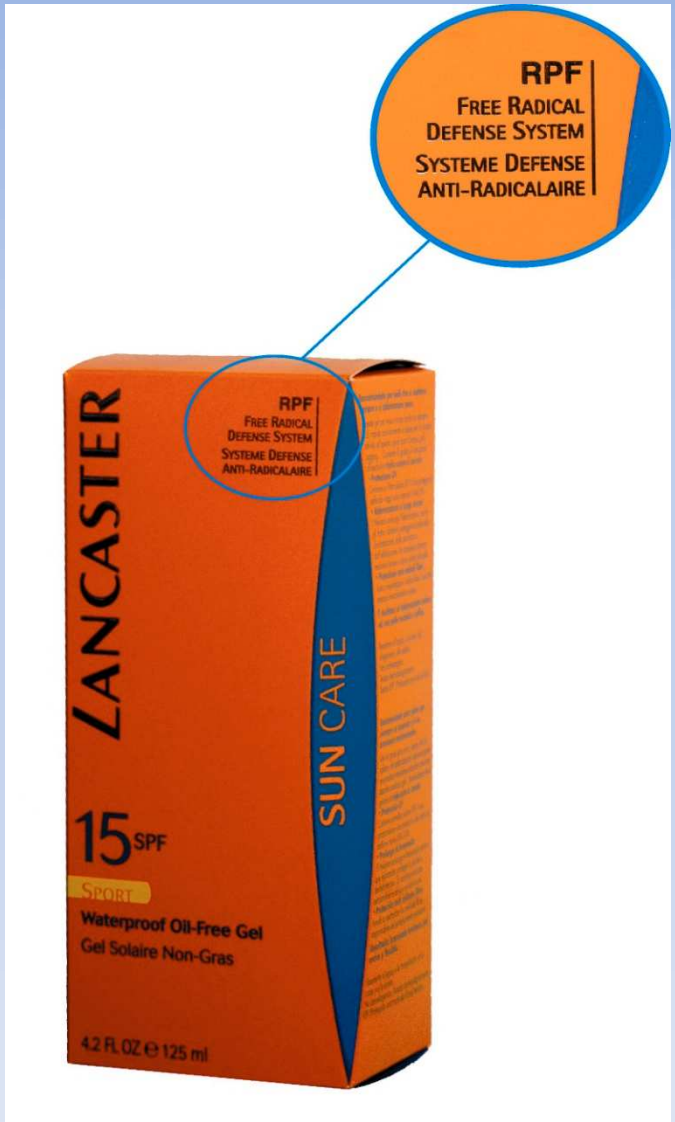
against
Free Radicals

measured with
ESR-Spectroscopy

Radical Protection Factor ®

RPF
tested by GALENUS
3600

for example:
RPF of 5 means a reduction of 5x 10^{14} radicals per mg substance


RPF
FREE RADICAL
DEFENSE SYSTEM
SYSTEME DEFENSE
ANTI-RADICALAIRE
LANCASTER
RPF
FREE RADICAL
DEFENSE SYSTEM
SYSTEME DEFENSE
ANTI-RADICALAIRE
SUN CARE
15 SPF
SPORT
Waterproof Oil-Free Gel
Gel Solaire Non-Gras
4.2 FL OZ e 125 ml

natural antioxi-dant	♋-Toco-pherol vitamin E mg %	Beta-Carotin mg %	Ascor-bin-acid mg %	Flavo-noide mg %	Unsaturated fatty acids C 16 %	Unsaturated fatty acids C 18 %	Ranzemat in value h (20l air with 110°C)	RPF 10^{14} rad/mg
Aronia	0.8-3.1	1.1-2.4	10-50	170-700				1300
Rose hip	-	1.0-2.7	470-4700					1570
Seabuck-thorn berry	3.0-18.0	0.0-18.7	100-1200	50-250				520
Sb pulp.-oil	45	120			38.8	16.2	35.5	290
Sb seed-oil	77	140			11.2	72.7	2.0	500
Sb pulp without seeds		145						625
Sb pulp with grounded seeds		141.9						1100

First essays to define with the phytoncides a common value for Seabuckthorn products were not successful.

We shall continue on this field.

Our residual free biotechnology and the quality management by determining the RPF value are innovations for the processing of Seabuckthorn-berries.

Thank you very much for your attention.