

# Natural solution for a skin microbiome friendly global care and odour reducer

**CRODAROM**  
Part of Croda International Plc

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## Introduction:

In this quest for mental and physical well-being, it is essential today for consumers to accept their appearance, their body by taking care of it as a whole: to be "Body positive". A new wave of holistic, honest, and inclusive products is coming to market to challenge the dictates of society. It's time to upgrade our daily body care routines and treat it with high-quality, high-performance, microbiome-friendly ingredients typically reserved for the face. Human scent is genetically controlled and systemically influenced by gender, ethnicity, along with emotional, physiological, and environmental factors (influence of the composition and quantity of sweat). With ageing, the diversity of odour causing bacteria, *Corynebacterium* mainly, increases and body odour changes (1) (2). Body malodour, including foot odour, suppresses social interaction by diminishing self-confidence (3) (4). *Zanthoxylum bungeanum* fruit extract (ZBFE) is evaluated for its global body care actions with multifunctional properties particularly for its malodour control and skin microbiota friendly capacity.

## Materials & Methods:

**SNIFF TEST.** The underarm odour intensity is self-evaluated from T0 to 8 hours after application (T8) of a roll-on formulation containing 3.0% ZBFE versus placebo. Volunteers are asked not to eat spicy food, onions, or garlic, and not to use any perfumed products. Scores from 5 very good odour to 0 none are attributed every hour. 14 volunteers are recruited, with 2 evaluations per volunteer, which makes it to a total of 28 set of data.

**INHIBITION OF LIPASE FROM CORYNEBACTERIUM XEROSIS.** Liposoluble glyceryl tributyrate used as a substrate of lipase is hydrolysed in glycerol and hydrosoluble butyric acid. The trouble of the culture medium of *C.xerosis* disappears proportionally with the hydrolysis of the glyceryl tributyrate and therefore with an increased lipase activity. This trouble is measured at 620nm by spectrophotometry.

**ASTRINGENCY CAPACITY.** Based upon tannin-polymer interaction resulting in the formation of insoluble polymer tannin complexes which then precipitates. The difference in optical density (OD) before and after precipitation corresponds to the astringency capacity of the product. Samples are incubated with and without Methylcellulose and the OD at 280nm is measured by spectrophotometer.

**SKIN MICROBIOTA FRIENDLY CAPACITY.** The inhibitory capacity on skin microbiota of ZBFE is evaluated for 48H in the presence of *Staphylococcus epidermis* (ATCC 12228), and *Corynebacterium xerosis* (ATCC 373). The first colonises predominantly the axillae, head, and nares. It may have probiotic functions by preventing colonisation of more pathogenic bacteria. The second is mostly innocuous, commonly existing in commensal relationships with its hosts. It is very much implicated in armpit malodour.

**HYDRATING EFFECT.** - Human Epidermal Keratinocytes (HaCaT) are cultivated for 3 days with and without ZBFE. Hyaluronic acid synthesis is quantified by ELISA. Normal Human Epidermal Keratinocytes (NHEK) differentiation at confluence is followed up visually by phenotype observation in the presence or absence of ZBFE.

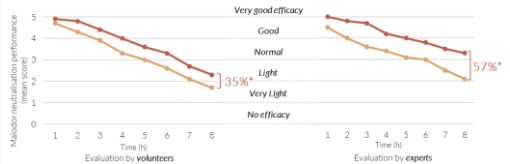
**ANTIOXIDANT CAPACITY.** The oxido-reduction decolourisation of DPPH to yellow DPPH-H and O<sub>2</sub> singlet scavenging capacity of ZBFE is followed by spectrophotometry.

**SOOTHING EFFECT.** Normal Human Dermal Fibroblasts (NHDF) are incubated with the test product for 24H. They are then irradiated or not with UVB at 60mJ/cm<sup>2</sup> and re-incubated with the product for another 24H. PGE<sub>2</sub> and IL6 synthesised are quantified by ELISA.

## Results & Discussion:

### SNIFF TEST.

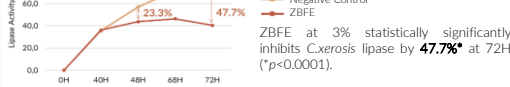
Evaluation of the malodour neutralisation performance of ZBFE by determining the intensity of body odour on volunteers. (\*p<0.01) — Negative Control — Roll-on 3% ZBFE



ZBFE's cream statistically significantly **decreases armpit malodour** after 8 hours by **35%\***. Another trial has been carried out with 5 experts panellists, trained, and used to odour and perfumes evaluation. Expert evaluation of ZBFE's cream, shows a statistically significant **decrease of armpit malodour** after 8 hours by **57.1%\***.

### INHIBITION OF LIPASE FROM CORYNEBACTERIUM XEROSIS.

Evaluation of the lipase inhibitory activity of 3% ZBFE on *Corynebacterium xerosis*.



ZBFE at 3% statistically significantly **inhibits C.xerosis lipase** by **47.7%\*** at 72H (\*p<0.0001).

### ASTRINGENCY CAPACITY.

ZBFE shows a statistically significantly higher astringency capacity of **295%\*** than tannic red wine in the experimental condition of this assay (\*p<0.0001).

### SKIN MICROBIOTA FRIENDLY CAPACITY.

*Corynebacterium xerosis*:..... **<14%**  
*Staphylococcus epidermis*:..... **<20%**  
ZBFE shows no antimicrobial properties on *C.xerosis* nor on *S.epidermidis* at the tested concentration.

### HYDRATING EFFECT.

Product	Conc	Variation (%)	Mean HA Variation (%)
CTRL			Ref
ZBFE (n=5)	0.14%	45%*	49%
	0.26%	159%*	208%*

ZBFE increases statistically significantly by **+208%\*** Hyaluronic acid synthesis at 0,26% in the experimental condition of this assay (\*p<0.01). It also increases keratinocytes **differentiation and keratinisation** (data not shown here).

### ANTIOXIDANT CAPACITY.



ZBFE decreases statistically significantly by **62%\*** DPPH and **49%\*** O<sub>2</sub> singlet in the experimental condition of this assay (\*p<0.01).

### SOOTHING EFFECT.



ZBFE decreases statistically significantly by **88%\*** PGE<sub>2</sub> and **63%\*** IL6 with UV induction in the experimental condition of this assay (\*p<0.01).

## Conclusions:

It is now generally accepted that skin bacteria cause body odour by biotransformation of sweat components secreted in the human axillae. This **biotransformation** is generated by enzymes like lipases secreted by bacteria for their metabolism creating among others VFA (volatile fatty acids) (5) (6). Currently it is believed that benefits of healthy skin microflora are comparable with those of healthy gut flora. Low diversity has also been associated with some dysbiotic skin disorders (7) (8). Therefore, **preserving** it seems increasingly important. There is therefore a significant shift from the current reliance of deodorants on fragrances and broad-spectrum antimicrobial agents. A new generation of deodorant systems appears based on targeting specific bacteria, metabolic pathways or key enzymes. *Zanthoxylum bungeanum* fruit extract (ZBFE) answers to this demand being a full body care product with a microbiota friendly action through inhibition of bacterial enzyme that generate odoriferous compounds and with astringent, protective, hydrating, and soothing properties.

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