

ACTIVE BEAUTY

DandErase™

The anti-dandruff revolution



Hair & scalp care / Anti-dandruff

Givaudan  
Human by nature



# Focus on the product

## Dandruff and *Malassezia*

**Dandruff** is a common scalp condition characterised by oily-yellow flakes and an itchy scalp, often accompanied by inflammation. A primary contributor to dandruff is the overgrowth of *Malassezia*, a genus of lipid-dependent yeasts that thrive in sebaceous areas of the skin. While these yeasts are normally part of the skin's microbiota, they can become problematic when environmental factors disrupt the balance.<sup>1</sup>

*Malassezia* consists of 18 species that act as both commensals and transient pathogens, with *Malassezia restricta* and *Malassezia globosa* being the most prevalent on the skin.<sup>1</sup> These yeasts produce enzymes like lipases and phospholipases, which contribute to scalp disorders, itch and inflammation.<sup>2</sup> **Nearly 50% of adults experience dandruff at some point**, especially those aged 20 to 50. Factors such as increased sebum production, stress, climate changes and prolonged head covering (hat, hijab, bandana, turban etc.), can predispose or worsen the condition, leading to **inflammation and discomfort**.<sup>3</sup> Additionally, an immune response dysregulation to *Malassezia* can worsen dandruff and scalp condition, activating pro-inflammatory pathways,<sup>4-6</sup> and even affecting **self confidence and mood**.

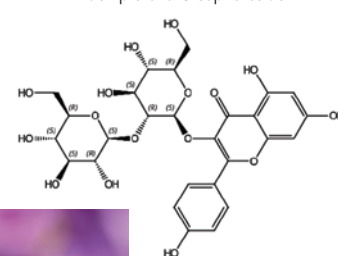
## Revealing Nature's Gold: the preciousness and efficacy of saffron flower

**Saffron:** From the vibrant landscape of Morocco to the Active Beauty Centre of Excellence in Green Fractionation in France, researchers have explored the remarkable properties of *Crocus sativus* L., commonly known as saffron. This plant is characterised by unique bioactive compounds such as **flavonoids** (like Kaempferol-3-O-sophoroside), and rare molecules identified as part of the phytocomplex (like Kinsenoside, Goodyeroside and 3-hydroxyubutyrolactone).

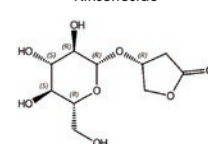
**DandErase™:** An extract obtained from *Crocus sativus* L. petals, by-products of saffron spice production. The **flowers** are harvested at dawn and, after removal of stigmas, are extracted only with water, optimised with the NaDES (Natural Deep Eutectic Solvents) technology to further enhance the solubilisation and stabilisation of these valuable compounds, **enhancing their efficacy and skin tolerance**.

A LCA (Life Cycle Analysis) was performed by an independent third party according to ISO 14040/14044 and assessed a low carbon footprint (2.7 kgCO<sub>2</sub>eq) thanks to the valorisation of the flowers, no use of pesticides, low fertilisers and little mechanisation. The resulting phytocomplex is rich with potent and rare molecules. This blend of cutting-edge science and sustainability positions DandErase™ as a powerful ingredient in cosmetic formulations aimed at **effectively addressing dandruff and scalp itch and inflammation**.

Kaempferol-3-O-sophoroside



Kinsenoside



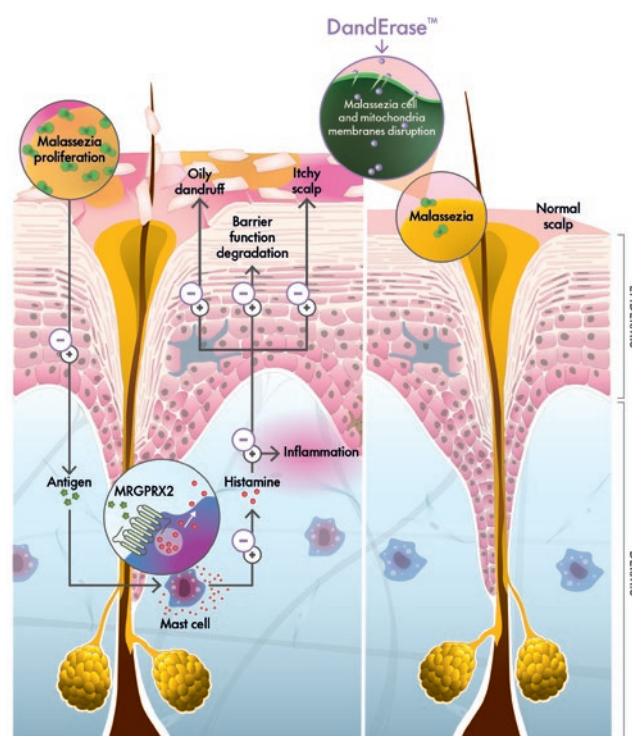
## DandErase™ selectively reduces *Malassezia* and dandruff

DandErase™ inhibits *Malassezia* spp. hyperproliferation:

- Disrupting the *Malassezia* cell membrane.
- Depolarising the *Malassezia* mitochondrial membrane.

This decrease in *Malassezia* spp. hyperproliferation, brings the following benefits:

- Decreasing inflammatory markers (TNF-α) and erythema.
- Mitigating itch (histamine via the **MRGPRX2 receptor**).<sup>7</sup>
- Restoring the skin/scalp barrier function (desmoglein-1).
- Balancing the microbiome (healthy scalp, long lasting anti-dandruff effect).



<sup>1</sup>Gaitanis et al., 2012; <sup>2</sup>Cafarchia et al., 2011; <sup>3</sup>Widaty et al., 2023; <sup>4</sup>(Piérard-Franchimont et al., 2006; <sup>5</sup>Jourdain et al., 2016; <sup>6</sup>Chandra et al., 2022); <sup>7</sup>Wang et al., 2020.

# Biological activity

## DandErase™: as good as synthetic benchmarks on *Malassezia* growth inhibition

### 1. *Malassezia* spp. growth reduction

*Malassezia globosa* cultures were resuspended to 10<sup>6</sup> CFU/mL to evaluate the growth inhibition potential of DandErase™ compared to well known anti-dandruff benchmarks: climbazole, ketoconazole and piroctone olamine after 24 hours.

**Results:** The benchmarks effectively inhibits *M. globosa* growth, while DandErase™ at a lower dose (dry matter) shows **equivalent efficacy**, underscoring its promise as a **dandruff-fighting agent**.

### 2. The power of the phytocomplex

The efficacy of DandErase™ against *M. globosa* was evaluated in comparison to its carrier (NaDES Eutectys BLA) and key biologically active compounds in the extract: kaempferol-3-O-glucoside (astragalin or K30G), kaempferol-3-O-sophoroside (K30S) and kinsenoside, all at equivalent doses. Cultures of *Malassezia* were resuspended to a final concentration of 10<sup>6</sup> CFU/mL to assess growth inhibition after 24 hours.

**Results:** DandErase™ exhibits significant growth inhibition, highlighting the synergistic power of the **phytocomplex** in its **antifungal activity** against *M. globosa*. This suggests that *Malassezia* species are less likely to develop resistance when exposed to such a complex matrix.

## DandErase™: soothing benefit

### 1. Promotion of anti-inflammatory balance

The soothing effect of DandErase™ was assessed on Normal Human Epidermal Keratinocytes (NHEK), pretreated for 24 hours with DandErase™ or with anti-dandruff benchmarks climbazole, or piroctone olamine. After inducing chemical stress (Phorbol myristate acetate, PMA) for an additional 24h, cytokines release was measured by Multiplex assay (anti-inflammatory: IL-1Ra, pro-inflammatory: TNFα, IL-6).

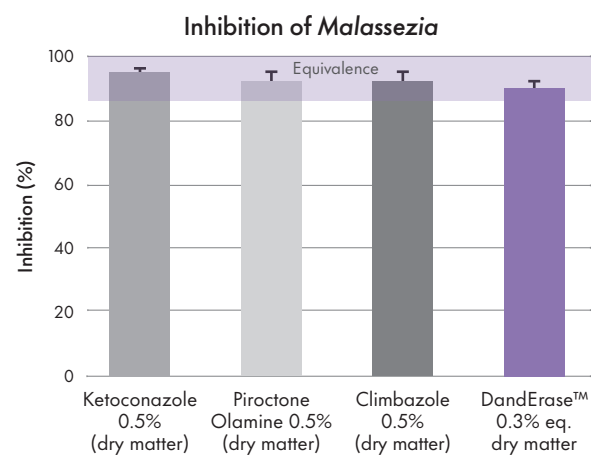
**Results:** DandErase™ significantly **reduces pro-inflammatory cytokines release**, demonstrating its ability to **alleviate inflammation** linked to scalp disorders. In contrast, piroctone olamine showed neutral effects, and climbazole exhibited even pro-inflammatory potential, as also represented in literature.<sup>8</sup>

### 2. Reduction of *Malassezia*-triggered pro-inflammatory markers

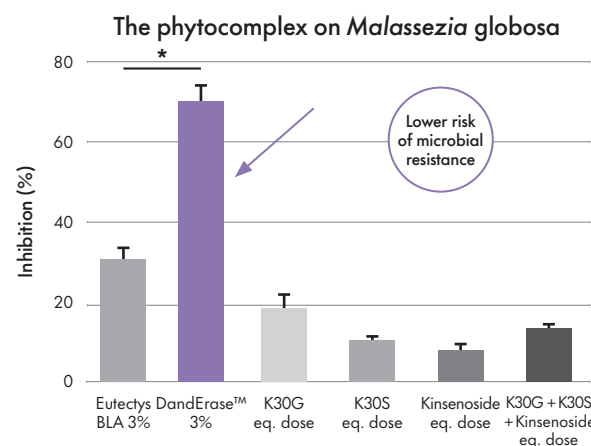
Scalp inflammation is normally associated to dandruff and *Malassezia* hyperproliferation.

Reconstructed Human Epidermis (RHE) containing Langerhans cells was pre-treated overnight with DandErase™ at 0.6%. The RHE was then exposed to an inactivated inoculum of *Malassezia* spp. (10<sup>4</sup> CFU/mL) for 2 hours. After rinsing, the product was reapplied for 24 hours, and the culture medium was collected to quantify the pro-inflammatory marker TNF-α (ELISA assay).

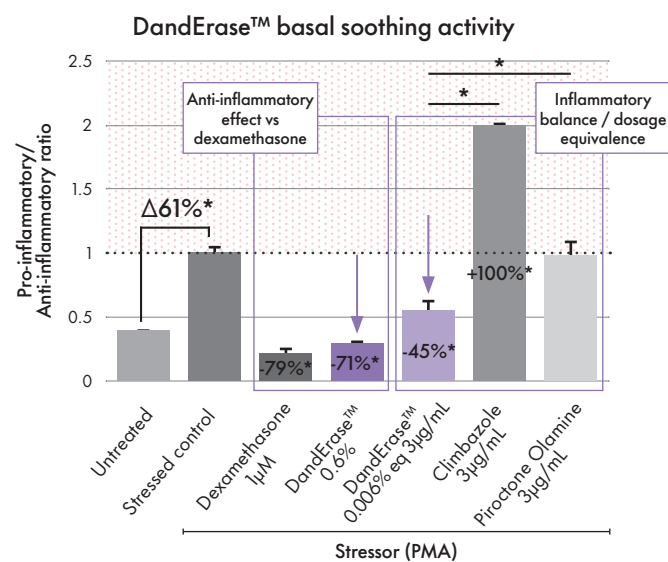
**Results:** DandErase™ significantly reduces the **inflammatory marker TNF-α triggered by *Malassezia* spp.** by **-25%\*\***.



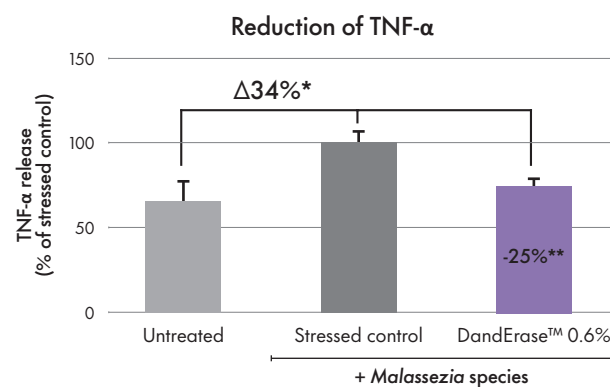
Mann-Whitney test: \*p<0.05



Mann-Whitney test: \*p<0.05



Mann Whitney test: \*p<0.05



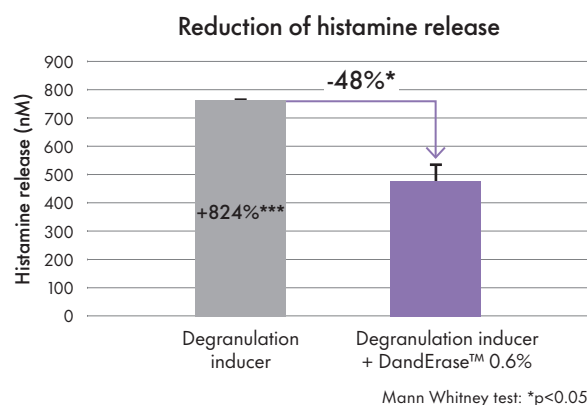
Student t-test: \*p<0.05; \*\*p<0.01

# Biological activity

## DandErase™: anti-itching activity

The hyperproliferation of *Malassezia* not only leads to dandruff and inflammation but also triggers itching. This response is mediated by the MRGPRX2 receptor on mast cell membranes, which induces histamine release. In this study, human mast cells were pre-incubated for 15 minutes with a medium containing DandErase™ at 0.6%, without it and with Cromoglycate 10 mM (positive control). Following this, an inducer (compound 48/80 at 5 µg/mL) was added to induce histamine release via degranulation. Histamine release was quantified in the cell media using an EIA kit.

**Results:** DandErase™ significantly **reduces histamine release by 48%\*** demonstrating its effectiveness in modulating the MRGPRX2 pathway, the primary receptor associated with itch.



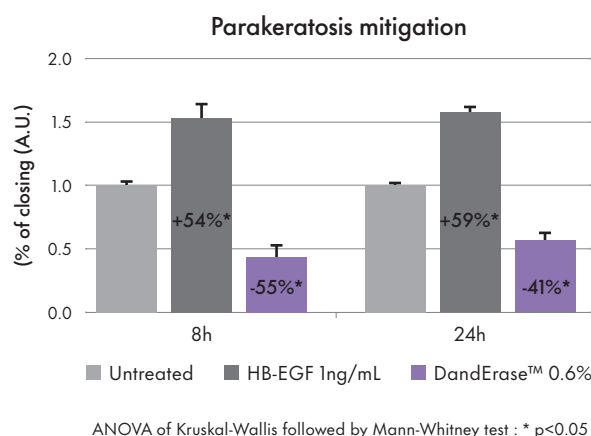
## DandErase™: skin barrier repair

Maintaining a **healthy skin barrier** is essential for overall **scalp health** and preventing conditions such as greasiness, irritation, and inflammation. DandErase™ plays a crucial role in **protecting and strengthening** the skin barrier through its holistic mechanism of action.

### 1. Inhibition of keratinocytes migration (8h and 24h)

Normal Human Epidermal Keratinocytes (NHEKs) were pre-treated for 24 hours with DandErase™ (0.6%). A scratch was then created on the cellular layer to simulate an injury, and the treatment with the active was renewed. After an additional 24 hours of incubation, wound closure was quantified using image analysis.

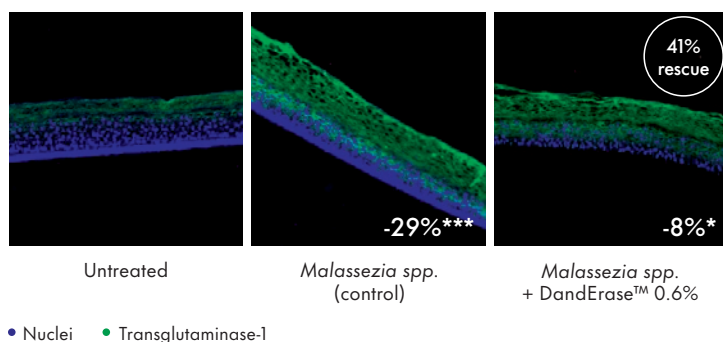
**Results:** DandErase™ **limits keratinocyte migration** by 55% at 8 hours and by 41% at 24 hours. This reduction helps **mitigate parakeratosis** (incomplete maturation of epidermal keratinocytes) commonly observed in scalp disorders related to *Malassezia* infection.



### 2. Reduction of epidermal hyperdifferentiation

Reconstructed Human Epidermis (RHE) containing Langerhans cells was pre-treated overnight with DandErase™ at 0.6%. An inactivated inoculum of *M. furfur*, *M. globosa*, and *M. restricta* (10<sup>4</sup> CFU/mL) was then applied for 2 hours. After rinsing, the product was reapplied for 24 hours. Transglutaminase-1 expression, a **marker of keratinocytes terminal differentiation**, was measured through immunofluorescence (IF).

**Results:** DandErase™ significantly reduces the **hyperdifferentiation provoked by *Malassezia* spp.** measured by Transglutaminase-1 expression, playing a key role in **skin barrier function**.

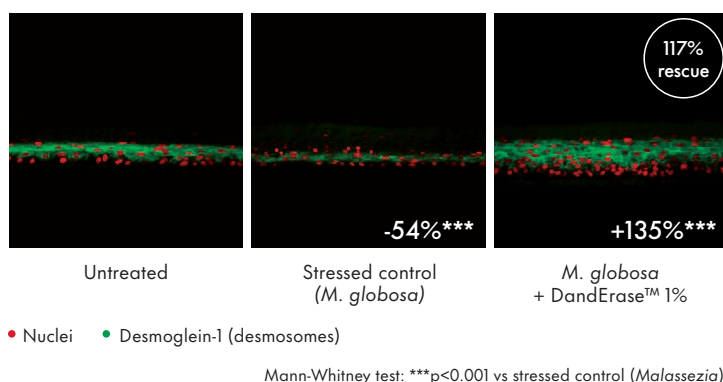


### 3. Reinforcement of desmosomes

The presence of *Malassezia* spp. induces barrier impairment, leading to a decrease in desmoglein-1 expression at the desmosomes level.

Reconstructed Human Epidermis (RHE), activated with sebum, was topically pre-treated with DandErase™ at 1% for 30 minutes before inoculation with *M. globosa* (2.10<sup>5</sup> CFU/mL). After rinsing, the product was reapplied for a total treatment of 48 hours. At the end of the culture period skin explants were fixed, tissue processing was done and immunostaining against Desmoglein-1 were performed by IF.

**Results:** DandErase™ significantly **reactivates desmoglein-1 expression by 135%\*** and promotes the improvement of **skin barrier integrity**.





# Clinical efficacy #1

## Anti-dandruff efficacy: as good as the benchmark, long-lasting effect

### DandErase™ as effective as #1 anti-dandruff shampoo

This study aimed to evaluate the anti-dandruff effects of a DandErase™-containing shampoo in a diverse population of 70 volunteers having dandruff (>300 C Cube), and itchy and sensitive scalp. The study was organised as follows:

- 30 volunteers using DandErase™ 3% shampoo > 15 switching to placebo shampoo D14 to D28 (long lasting efficacy evaluation).
- 20 volunteers using placebo shampoo.
- 20 volunteers using benchmark shampoo.

Use of shampoo 3 times per week.

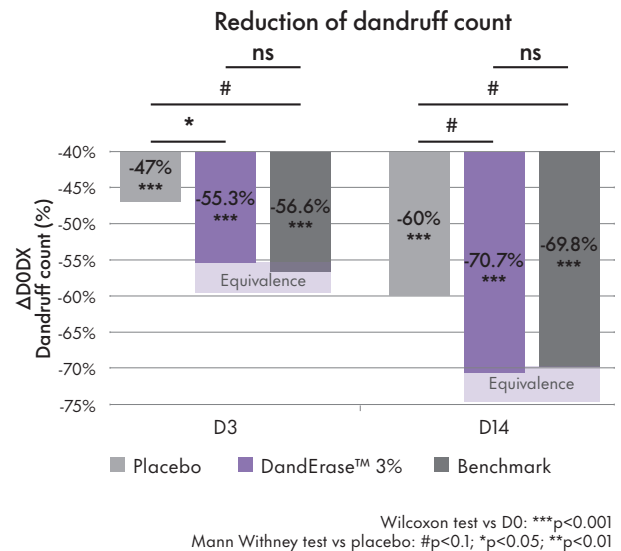
Measurements were carried out at D-7 (before the wash out period), and at D0, D3, D14.

Dandruff evaluation was performed with C Cube and Dandruffmeter.

**Results 1/3:** After just 3 days (with only 2 shampoo applications), DandErase™ reduces dandruff count as effectively as the #1 anti-dandruff shampoo in the market, achieving up to a **95% reduction in dandruff** by day 3, efficacy was shown in **100% of volunteers**.

After 2 weeks, the average decrease in dandruff count was -71% compared to baseline, with results **up to -97%**, demonstrating equivalent efficacy to the benchmark.

Up to  
-95% and -97%  
vs D0  
after D3 and D14



#### Volunteer 07



D0

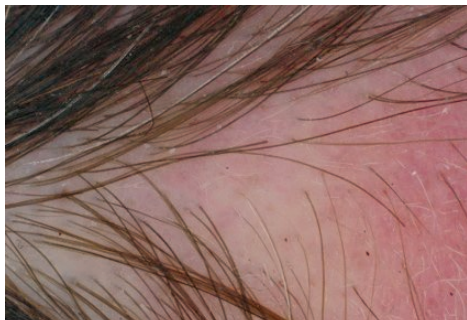


D3



D14

#### Volunteer 47



D0



D3



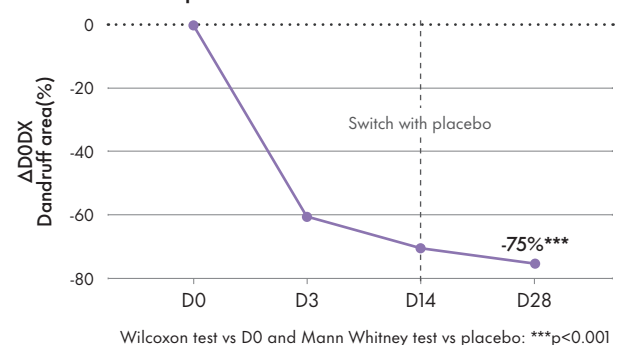
D14

**Results 2/3:** Erythema was reduced by 4.8x (D3) to 5x at D14 versus placebo.

**Results 3/3:** DandErase™ induces a long-lasting effect on microbiome stabilisation with the reduction of dandruff continuing to decrease even two weeks after stopping the treatment.

Erythema continues to decrease as well.

#### Scalp stabilisation: maintenance of results



# Clinical efficacy #2

## DandErase™ protects and restores the scalp Interabiome

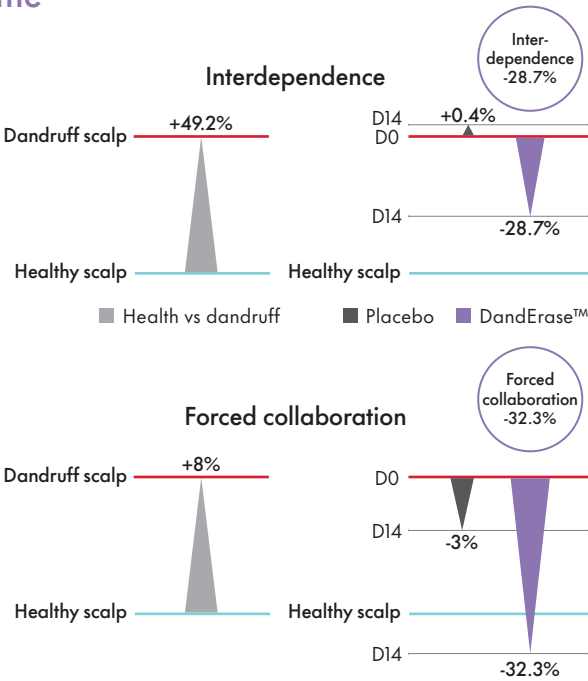
### Interabiome: microflora interactions, stability and resilience

A diverse panel of 20 volunteers aged 18-70 with oily, itchy scalps and 210-1400 dandruff counts participated in a double-blind study in France. After a 2-week washout, 10 participants used a 3% DandErase™ shampoo, while the other 10 used a placebo, applying it three times a week for 2 weeks. The **scalp microbiome evolution was monitored** through Real-Time PCR focusing on 20 specific targets\*, compared to the same evaluation on 10 volunteers with a healthy scalp.

**Results:** DandErase™ optimises two parameters: interdependence and forced collaboration that should be low to ensure that the disruption of one strain does not compromise the others. Interdependence is almost 50% higher in a dandruff scalp compared to health population, and DandErase™ in 2 weeks reduces interdependence by **28.7%** and forced collaboration by **32.3%**. DandErase™ enhances scalp health **fostering interabiome stability and resilience**.

DandErase™ effectively **reduces all Malassezia species** over two weeks without altering bacterial balance, **confirming its targeted selectivity**.

\*3 Cutibacterium species (+ genus), 4 Staphylococcus species (+ genus), Corynebacterium, Enterococcus, Lactobacillus, Prevotella, Streptococcus, Lawsonella clevelandensis, Pseudomonas aeruginosa, 3 Malassezia species (+ genus)

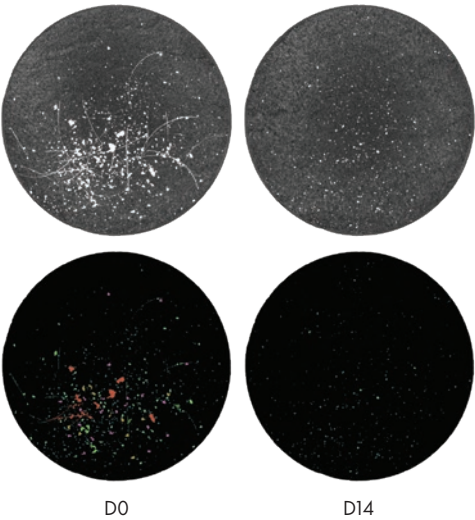


## Anti-dandruff, soothing and scalp rebalancing activity

### DandErase™ reduces dandruff towards a healthier scalp

In the same group of volunteers, dandruff and erythema were measured to confirm the benefits observed by a rebalanced Interabiome.

**Results:** DandErase™ significantly **reduces dandruff up to 95.4% (D14)** compared to baseline (D0), with 90% of participants experiencing improvement. Additionally, the **erythema index decreases by 2.6x** compared to the placebo, benefiting 80% of the volunteers.



## Consumers Home Usage test (HUT)

### DandErase™ confirms its anti-dandruff efficacy while promoting well-being

The product was tested for 14 days on consumers with dandruff and were users of a market-leading shampoo brand (126 French and 150 Chinese consumers, 50:50 men / women aged 19~59). They responded to 3 questionnaires at D0, D7 and D14, using Mood Portraits™ 2.0<sup>1</sup> and Finger Tracking<sup>2</sup>.

<sup>1</sup> Givaudan proprietary non-verbal neuroscience method using pictures to measure consumers' mood and emotional responses; <sup>2</sup> Neuroscience method measuring both implicit & explicit results.

**Results:** DandErase™ sets new standards in just **one week**: consumers massively perceived a **strong anti-dandruff efficacy**, performing **better than their current shampoo** (benchmark) and featuring an **amelioration of well-being**.

Dandruff reduction



-90%

fewer severe dandruff sufferers in just 7 days

Well-being improvement



88%

notice an improvement of their well-being with a significant increase of positive emotions\*

Better than benchmark



8/10

of consumers acknowledge the DandErase™ shampoo outperforms their current benchmark

\*relaxation, de-stress, and mindfulness / radiance



# Summary



COSMOS  
APPROVED

## Technical information

INCI:	Water (and) Betaine (and) Potassium Lactate (and) Lactic Acid (and) Crocus Sativus Flower Extract
Origin:	Green fractionation
Preservation:	None
Appearance:	Light brown to brown liquid
Solubility:	Hydrosoluble
Dosage:	3%
Processing:	Can be added at the end of the formula process at a pH between 4 and 8 and a temperature below 40°C.



## Benefits

Claims:	Anti-dandruff*, itching reduction, redness reduction, scalp soothing, microbiome balancing, <i>Malassezia spp.</i> reduction, long lasting effect, improves the appearance of the scalp, reduces flakiness, maintains a healthy scalp**, optimal tolerability
Applications:	Hair and scalp care, shampooing, rinse off and leave on scalp lotions, long lasting / maintenance scalp care

\*The Givaudan Active Beauty product «DandErase™» is intended to be used only for cosmetic application. Anti-dandruff claim is allowed in cosmetic applications in Europe. Note that in the USA, anti-dandruff is considered OTC, in Korea as Drug, in Japan as Quasi-Drug. In China, despite there is no positive list of anti-dandruff agents, the concentration in finished products needs to be tested as well as the efficacy. It is the customer's responsibility to assess which claims are compliant with cosmetic regulation in the countries where the final product is launched.

\*\* Claim not applicable in the US market.



# Givaudan Active Beauty Sales Offices

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