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# Greek Mountain Tea for Beauty Sleep and Night-Time Recovery

B. Walzel, A. Herrmann, U. Bätz, T. Shahzad, B. Senti, S. Bänziger



## abstract

Good sleep is essential for our mental and physical health. Good sleep also makes our skin look more radiant and refreshed [1]. Tea rituals are known to promote sleep. They help to relax and unwind, they create a mood of calm, and they facilitate sleep. Therefore, tea-inspired ingredients are a good starting point to create cosmetic night-care concepts, especially ingredients derived from herbal teas that are free of stimulating substances.

Greek mountain tea (*Sideritis scardica*) has a long tradition as natural remedy to calm body and mind. This unprocessed, caffeine-free, herbal tea has been used for centuries as natural sleep support. But there is more to mountain tea: it contains protective and regenerative phytochemicals that help our skin to recover overnight.

Here we present Mountain Tea Pro (from now on called “Mountain Tea Extract”), a natural extract of organic *Sideritis scardica* herb from a traceable source, that brings together the concept of tea-inspired beauty rituals and activity-proven benefits for skin. It is a perfect cosmetic ingredient to create relaxing night-care, mood-enhancing self-care, and beauty-sleep products.

## Mountain tea – a tradition of calming and relaxing

Mountain tea is a legendary herbal tea made from the leaves and flowers of *Sideritis scardica* (Figure 1). The plant is found in the Mediterranean mountains of Greece, Albania, Bulgaria, Macedonia, or Turkey where, according to local tradition, the herb carries different names: For example, it is referred to as “Olympus Tea”, when grown around Mount Olympus (the home of the Greek gods) or as Shepherd’s Tea because Greek shepherds prepare their tea high in the hills from freshly picked *Sideritis* plants [2,3].

For its delicious taste and health benefits mountain tea has been used for centuries as natural remedy to relax, to treat anxiety or depression, but mostly, this caffeine-free herbal tea is used as natural sleep support until today [4]. In contrast to classical black tea, mountain tea has never been part of sophisticated afternoon teatime rituals. Instead, it has remained a humble, unprocessed, natural, and caffeine-free herbal tea that is liked by the common population in the Balkans, loyal to their traditions.

Today, herbal teas with their strong traditional values and mood-enhancing qualities, perfectly fit into a lifestyle of self-care and well-being. This is why tea rituals are a great inspiration for beauty concepts. They create emotional moments that calm, relax, and facilitate sleep. And beauty sleep is a real thing! Researchers found that sleep is essential for health, well-being, productivity, memory, and aging [1]. In sleep ex-



Fig. 1 The famous *Sideritis* herb in its natural habitat.

periments they could show that people who miss out on sleep do appear less attractive to others [1]. Thus tea-infused beauty concepts perfectly address consumers that look to balance their hectic lifestyles with relaxing self-care. Here, mountain tea (*Sideritis scardica*) offers great opportunities.

## Ethical sourcing – organic raw material from a Greek farming family

Lipoid Kosmetik sources *Sideritis scardica* as raw material for the Mountain Tea Extract (INCI: Glycerin, Aqua (Water), *Sideritis Scardica* Flower/Leaf/Stem Extract) from a local family

plantation in the mountainous backland of Western Greece – a remote, rural region void of industry pollution or urban centers (Figure 2). The tea’s cultivation is fully organic, and its harvest has remained traditional, where leaves are hand-picked, bundled, and dried on open air. The sourcing supports local business and promotes the well-being of the local population.

### Mountain Tea Extract – caffeine-free and rich in protective compounds

This study’s objective was to highlight the presence of secondary metabolites in Mountain Tea Extract with protective and regenerative activity and to show the absence of secondary metabolites with potentially energizing, stimulating, or activating function - notably caffeine, which is known to trigger the skin’s energy metabolism.

The presence of protective flavonoids and phenolic compounds was validated by high-performance thin-layer chromatography (HPTLC) analysis (Figure 3A). The relative content of caffeine was quantified by high-performance liquid chromatography (HPLC) analysis (Figure 3B).

As a result, Mountain Tea Extract has a high-value flavonoid and phenolic compound profile (Figure 3A) with protective and regenerative phytochemicals that support skin recovery. Yet, in contrast to classical tea varieties (derived from *Camellia sinensis*), mountain tea does not contain stimulating caffeine (Figure 3B). This makes Mountain Tea Extract an optimal cosmetic ingredient for calming, relaxing, and de-stressing night-care.



Fig. 2 Organic farming of mountain tea herb in Western Greece.

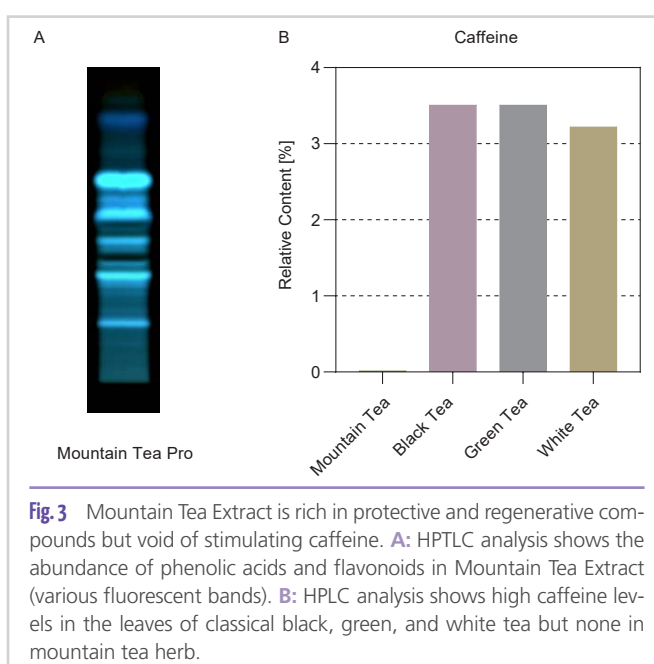


Fig. 3 Mountain Tea Extract is rich in protective and regenerative compounds but void of stimulating caffeine. **A:** HPTLC analysis shows the abundance of phenolic acids and flavonoids in Mountain Tea Extract (various fluorescent bands). **B:** HPLC analysis shows high caffeine levels in the leaves of classical black, green, and white tea but none in mountain tea herb.

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## Mountain Tea Extract protects from light-induced oxidative stress

This study's objective was to show that Mountain Tea Extract has antioxidant activity and to show that mountain tea activates the skin's cellular antioxidative defense system.

In an *in vitro* study, cultured human keratinocytes were preincubated with Mountain Tea Extract in the presence of a photoinducible biosensor and exposed to light flashes. The amount of generated free radicals was quantified using a LUCS (Light-Up Cell System) [5].

In a second *in vitro* assay, the cells were preincubated with Mountain Tea Extract and the skin's capacity to adapt to oxidative stress was measured using the Nrf2 reporter gene assay. This assay quantifies the activation of the Antioxidant Response Element, a binding site of the nuclear transcription factor Nrf2, which is a master regulator for antioxidant enzymes and proteins in the skin. Activation of the Nrf2 pathway increases the skin's capacity to adapt to oxidative stress [6].

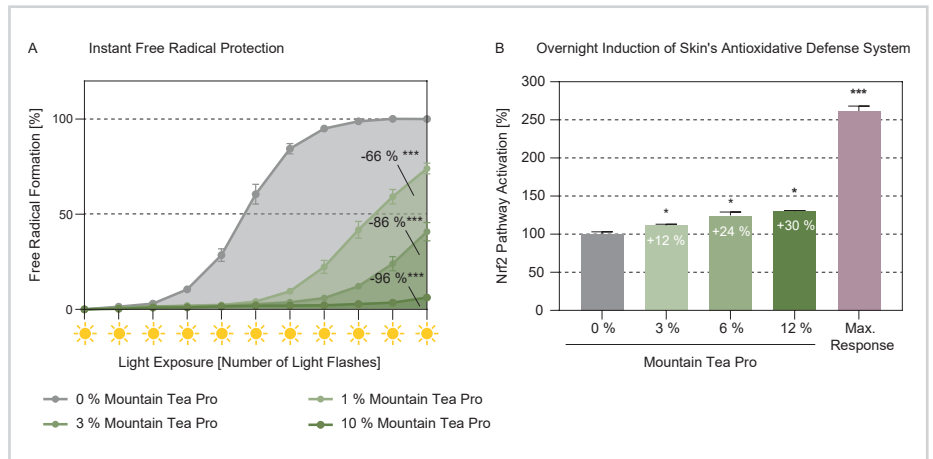
As a result, Mountain Tea Extract showed strong antioxidant protection already at low concentrations. The incubation with 1% Mountain Tea Pro was sufficient to reduce the number of intracellular, free radicals by 66% (Figure 4A).

Further, Mountain Tea Extract boosts the skin's capacity to adapt to oxidative stress by activating the Nrf2 pathway (Figure 4B). Overnight incubation with Mountain Tea Extract stimulated the synthesis of antioxidative defense genes by 12 – 30% in a concentration-dependent way. As positive control, 25 µM of sulforaphane were used to reveal the maximal response of the system.

Overall, Mountain Tea Extract provides direct and instant antioxidant protection as it neutralizes light-induced free radicals. Further, it indirectly protects from oxidative stress by activating the skin's own defense system. Hence, Mountain Tea Extract is an effective ingredient for protective and regenerative skin-care.

## Mountain Tea Extract restores the skin's antioxidative potential

This study's objective was to show that Mountain Tea Extract regenerates the skin's antioxidative potential

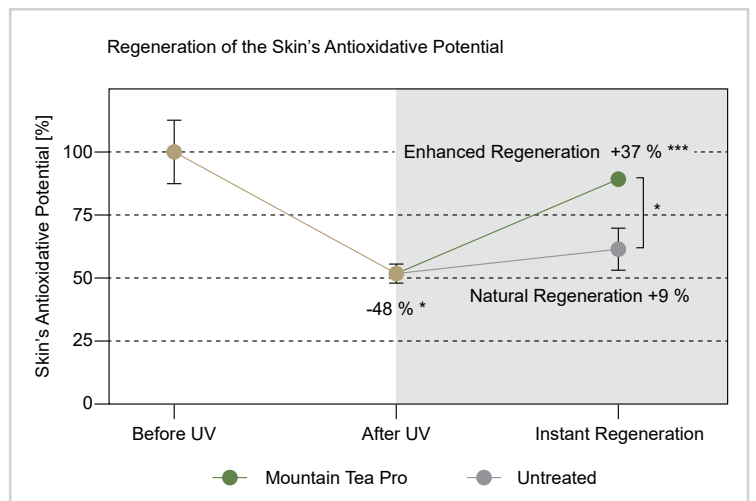


**Fig. 4** Mountain Tea Extract strengthens the skin's intrinsic antioxidative defense – directly and indirectly. **A:** Kinetic data of real-time free radical production upon light stress. **B:** Increase of Nrf2 downstream gene activation. Both tests were performed as two independent experiments, each with triplicates; Mean +/- SEM; Student's t-test versus untreated; \* = p < 0.05; \*\*\* = p < 0.001.

(SAP), which was weakened earlier by exposure to sunlight. The skin's SAP is the capacity to neutralize free radicals [7].

In this *ex-vivo* test, the SAP was measured before and after exposure to artificial sunlight emitted by a solar simulator. Light exposure induced free radicals inside the skin that were quantified by electron spin resonance (ESR) spectroscopy.

As a result, repeated sunlight exposure reduced the skin's capacity to cope with oxidative stress by 48%. At night, in the absence of sunlight, this depletion of SAP naturally recovers by 9% without any treatment, whereas the application of Mountain Tea Extract boosts the regenerative process, lifting the SAP to 37% (Figure 5).

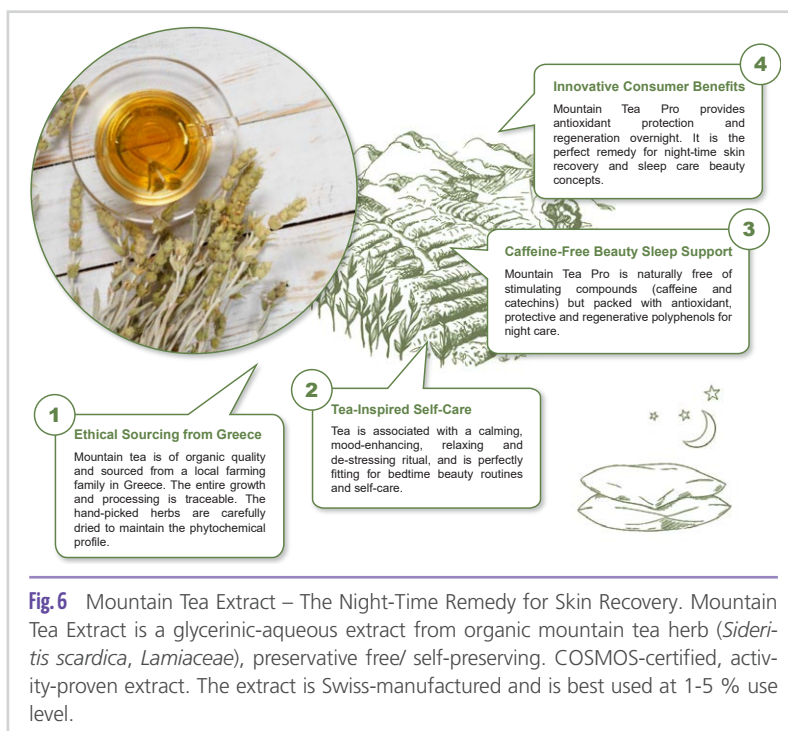


**Fig. 5** Sunlight exposure depleted the skin's antioxidative potential (white area left). The subsequent application of Mountain Tea Extract in the absence of light exposure (gray area right) rapidly reverts the skin's antioxidative potential (SAP). SAP was measured by electron spin resonance (ESR) spectroscopy in an *ex vivo* skin model. N = 3-4; Mean +/- SEM; Student's t-test versus baseline and between treatments; \* = p < 0.05; \*\*\* = p < 0.001.

## Mountain Tea Extract – The Night-Time Remedy for Skin Recovery

In conclusion, Mountain Tea Extract brings together the concept of tea-inspired beauty rituals and activity-proven benefits for skin. Mountain Tea Extract conveys a mood of calm and relaxation, it is free of stimulating caffeine, and it recovers the skin's daylight-depleted stress-resistance at night. In addition, the plant material is of organic quality from a traceable source, grown in a way that is sustainable and socially responsible.

This makes Mountain Tea Extract an excellent active ingredient for cosmetic night-care, for tea ritual-inspired beauty concepts, for de-stressing and calming wellness applications, for relaxing evening care, for mood-enhancing self-care, and for beauty-sleep products (Figure 6).



**Fig. 6** Mountain Tea Extract – The Night-Time Remedy for Skin Recovery. Mountain Tea Extract is a glycerinic-aqueous extract from organic mountain tea herb (*Sideritis scardica*, Lamiaceae), preservative free/ self-preserving. COSMOS-certified, activity-proven extract. The extract is Swiss-manufactured and is best used at 1-5 % use level.

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### authors

Dr. Bernd Walzel,  
Dr. Anja Herrmann,  
Dr. Ulrike Bätz,  
Tamina Shahzad,  
Beatrix Senti,  
Dr. Stefan Bänziger,

Lipoid Kosmetik  
Sennweidstrasse 44/46 | CH-6312 Steinhausen | Switzerland  
[www.lipoid-kosmetik.com](http://www.lipoid-kosmetik.com)

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