



COSMOS
APPROVED

RootBioTec HW
Prevents hair loss –
ensures fuller hair



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An Extract from a Hairy Root Culture from Basil to Treat Hair Loss

Based on an extract from a hairy root culture from basil, RootBioTec HW helps reduce hair loss by inhibiting 5 α reductase activity and by stimulating dermal papilla cells.

Hair loss affects both women and men. In 95% of all cases of hair loss occurring exclusively on the head, the cause is an increased sensitivity of the hair follicles to the androgenic hormone dihydrotestosterone (DHT). Androgenic alopecia, which is the name of the condition, is hereditary, permanent and continues as one gets older.

RootBioTec HW was shown to strongly inhibit the activity of 5 α reductase II (the enzyme that promotes the conversion of testosterone to DHT). Meanwhile, another study was conducted with starving dermal papilla cells, the cells that are responsible for hair growth. RootBioTec HW improved their proliferation by 23%, indicating a hair regrowth effect. In a clinical study conducted for two months on volunteers with mild to moderate hair loss, RootBioTec HW showed the capacity to reduce hair loss by 26% after the first month and 31% following the second month.

This suggests that RootBioTec HW is a potent cosmetic active that will prevent hair loss and enable users to regain fuller and denser hair.

RootBioTec HW is COSMOS approved*.

* Raw material approved by ECOCERT GREENLIFE in accordance with the COSMOS Standard

RootBioTec HW

- Prevents hair loss
- For fuller hair
- Stimulates hair papilla cells
- Rejuvenates the scalp

Applications

- Hair serum
- Conditioner
- Hair pack
- Anti-aging hair care
- Hair oil (with oil-soluble version)

Formulating with RootBioTec HW

- Recommended use level: 1–3%
- Incorporation: For cold processes, dissolve RootBioTec HW into the aqueous phase. In cold/hot processes, add during the cooling phase below 60°C
- Thermostability: For short periods, temperatures of up to 60°C will not affect the stability of RootBioTec HW.

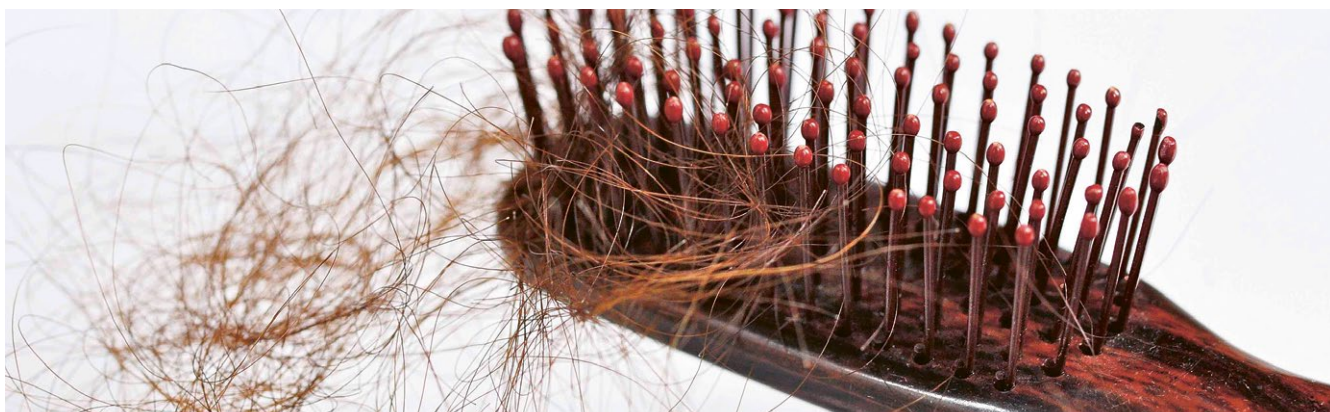
INCI (EU/PCPC) Declaration

RootBioTec HW (standard version, COSMOS approved*):
Ocimum Basilicum Hairy Root Culture Extract (and)
Alcohol (and) Aqua/Water

RootBioTec HO (oil-soluble version): Ocimum Basilicum Hairy Root Culture Extract (and) Helianthus Annuus (Sunflower) Seed Oil (and) Cocos Nucifera (Coconut) Oil

December 2019

Hair Loss Affects Men and Women



RootBioTec HW

Hair loss and its various causes

Hair Loss Has Several Causes

The typical person has between 100,000 and 150,000 hairs on his or her head. In order to maintain a normal volume, hair must be replaced at the same rate at which it is lost. On average, one hundred strands are normally lost over the course of a day. If this average number is clearly exceeded over a longer period then the individual is experiencing hair loss.

Hair loss, the technical term for which is alopecia, can occur for a variety of reasons. These include infections, thyroid and hormonal imbalances, nutritional deficiencies, stress, trauma, drugs, or it may occur as the result of an autoimmune phenomena.

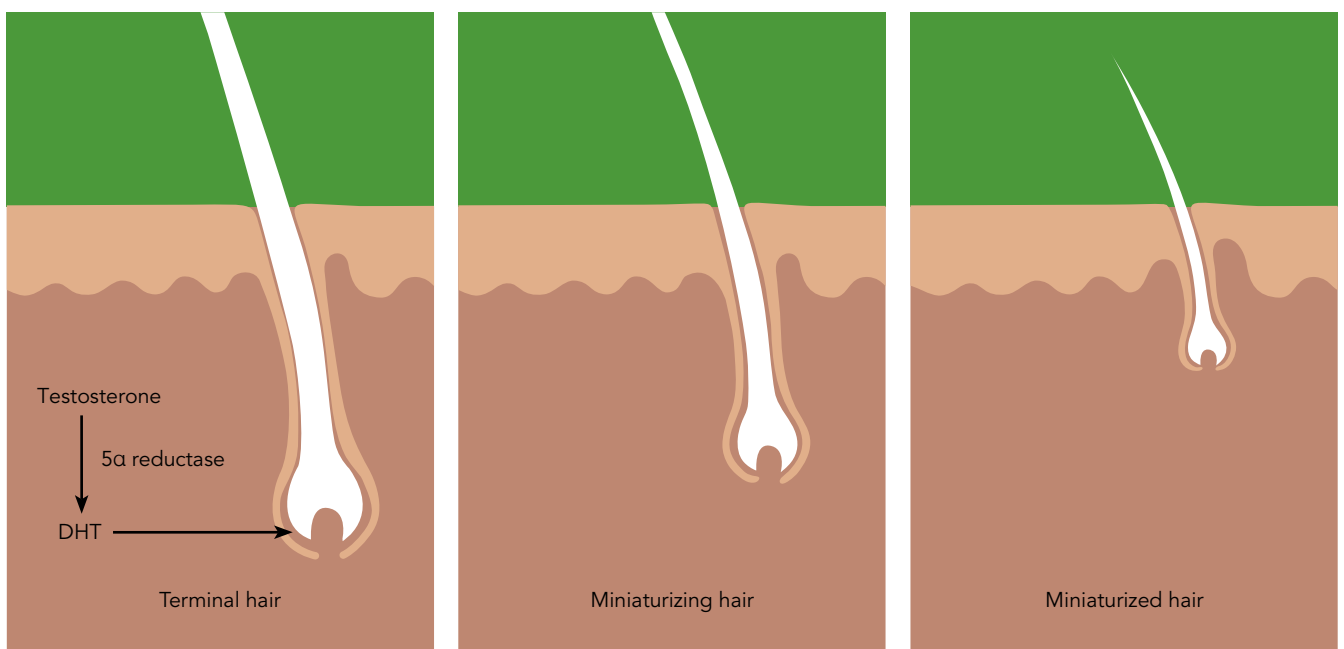
Many of these hair loss problems are temporary, although there is another type of hair loss that is less dramatic and less visible but can be incredibly distressing. This involves the hair thinning gradually, often over the course of several decades. It can start at any age, it is progressive and it is hereditary. Androgenic alopecia, as the condition is known, is male hormone-related but it is not caused by excessive testosterone. Instead, the hair follicles become more sensitive to the hormone due to a genetic predisposition.

An enzyme, 5 α reductase, leads to the conversion of the male sex hormone testosterone into the active form dihydrotestosterone (DHT). This hormone causes the hair follicles to produce thinner and smaller hair, until the point that the hairs stop growing.

Women and Men are Affected – but in Different Ways

It is not only men but also women who can suffer from androgenic alopecia, although androgens are typically present in much smaller amounts. In fact, men are considerably more affected by hair loss (statistics suggest up to 70% of men experience hair loss). Meanwhile, approximately 30–40% of women experience hair loss. In contrast to men, this occurs less in the area of the receding hairline or tonsure, but instead appears on the top side of the head and through the spotty formation of gaps or diffuse hair loss.

Mechanism of Androgenic Alopecia



Production of RootBioTec HW from Basil

A novel technique developed to produce high quality plant metabolites

Basil, the King of Herbs

Basil is a common name for the culinary herb *Ocimum basilicum* which is sometimes known as St Joseph's Wort in certain English-speaking countries.

The word comes from the Greek word *basileus*, which means "King". Indeed, basil is considered the "King of herbs" by many authors of cookery books and plays an important role in both Italian and Asian cuisine.

Basil is known to contain high concentrations of essential oils and potent antioxidants with anti-aging, anti-cancer, anti-viral and anti-microbial properties. Because of these valuable components, basil is also used for its medicinal properties in Ayurveda, the traditional medicinal system of India.

RootBioTec – a Novel Technique Developed to Produce Cosmetic Actives

For the production of RootBioTec HW, Mibelle Biochemistry developed a novel sustainable technique to produce high amounts of the active compounds of basil in bioreactors.

The "hairy roots" technology is a type of plant tissue culture that is used to produce high quality, phyto-genic compounds of pharmaceutical value.

Hairy Root Induction in the Lab

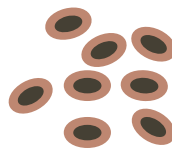
A small part of the basil plant was infected with the naturally occurring soil bacterium *Agrobacterium rhizogenes* and cultivated on an agar plate. This infection led to a natural transformation of plant cells which can then form tiny roots – the so-called "hairy roots".

These hairy roots can be further propagated on artificial culture media in petri-dishes or suspended in liquid media. After producing sufficient biomass, the roots are harvested and the active compounds are extracted and dissolved in a carrier oil to make them available for hair treatment formulations.

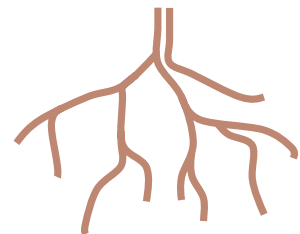
Production Process of RootBioTec HW



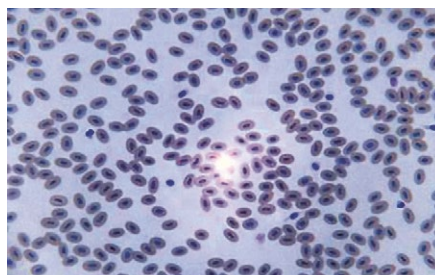
Basal content of bioactive substances



Transformation with *Agrobacterium rhizogenes*



Increased production and release of bioactive substances



RootBioTec HW

Study results



Inhibition of 5α Reductase II

5α reductase is the key target enzyme in the inhibition of hair loss. It transforms the hormone testosterone into the active form dihydrotestosterone (DHT). Two isoforms of this enzyme are known with a different distribution in tissues and developmental stages. In scalp hair follicles 5α reductase type II has been detected. Balding scalps contain increased 5α reductase type II activity and DHT levels. In our study, the inhibitory potency of a RootBioTec Basilicum extract was measured and compared to Finasteride, an approved 5α reductase inhibitor.

The results showed a clear concentration dependent inhibition of 5α reductase II activity with an IC₅₀ value of 2.62 mg/ml. Consequently, RootBioTec HW might be able to reduce hair loss in people with androgenic alopecia.



Reinforcement of Dermal Structures

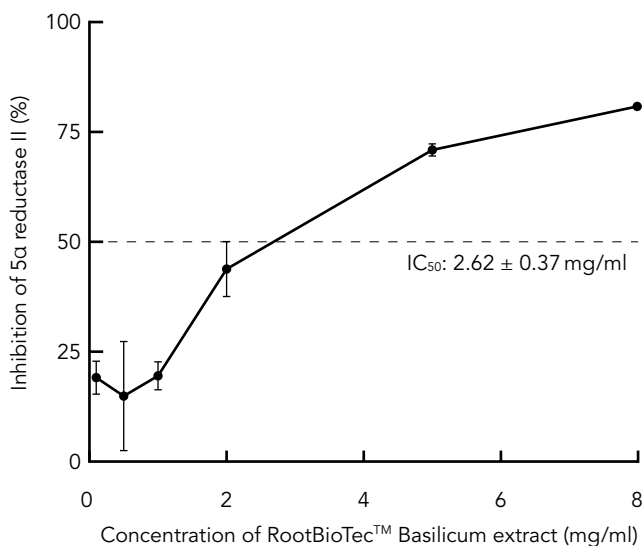
In aging skin, collagen content is markedly reduced. As a result, the dermal strength of the scalp also decreases and this promotes hair loss.

The effect of RootBioTec Basilicum extract on the expression of collagen I and III genes was evaluated in aged human dermal fibroblasts (Hayflick model).

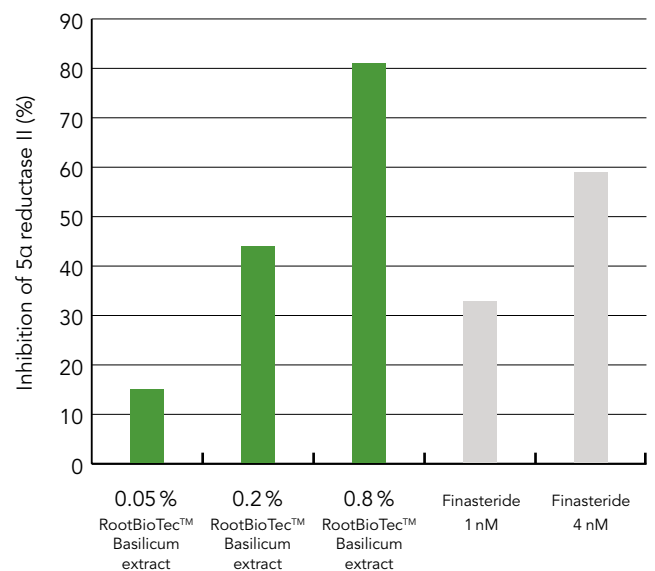
Replicative senescence of fibroblasts induced a down-regulation of the collagen I and III genes. However, RootBioTec Basilicum extract was shown to diminish this decrease for the collagen I gene and almost compensate it for the collagen III gene.

Therefore, RootBioTec HW reinforces the dermal structures on the scalp and helps to delay hair loss.

IC₅₀ Value of RootBioTec Basilicum Extract



Inhibition of 5α Reductase II





Increased Proliferation of Dermal Papilla Cells

Dermal papilla cells are located within the hair follicle bulb and play an essential role in the control of hair growth. And this is not only in the normal hair cycle but also in the pathogenesis of certain conditions, such as androgenic alopecia.

The effect of RootBioTec Basilicum extract on dermal papilla cell proliferation was investigated by the MTT assay.

Human dermal papilla cells were serum starved for 18 hours to stop cell proliferation and then treated with RootBioTec Basilicum extract during a period of 72 hours. VEGF (vascular endothelial growth factor) was used as a positive control of cell proliferation.

The results showed that RootBioTec HW can stimulate the dermal papilla cells to regain their proliferation capacity.



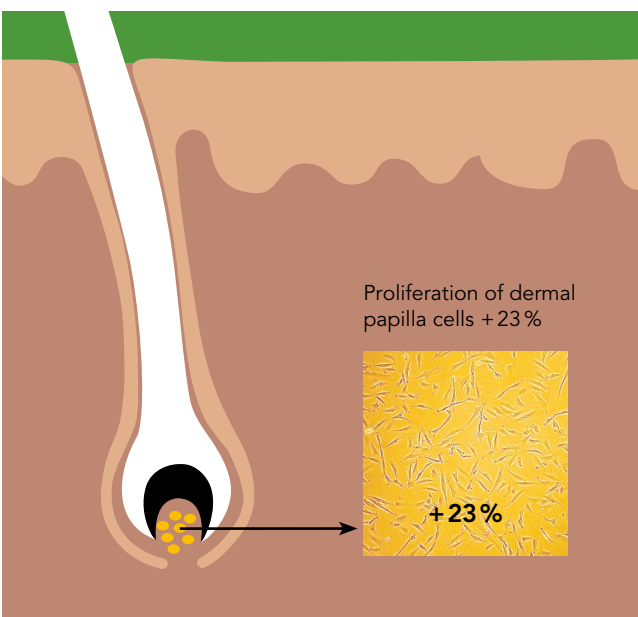
Anti-Hair Loss Effect

The effect of RootBioTec HW against hair loss was evaluated on 19 women and 2 men aged between 25 and 67 years (average 51.1 years) suffering from mild to moderate hair loss (daily hair loss >100 strands).

The volunteers applied a fluid containing 1% RootBioTec HW every evening for two months. Initially, after one and two months respectively, volunteers collected their lost hair (this was done in the mornings and involved only hair lost through combing). For the analysis the average was taken from total counts made on three consecutive days. Following one month of treatment the number of lost hair dropped by 26%. Meanwhile, after two months it reduced by 31%.

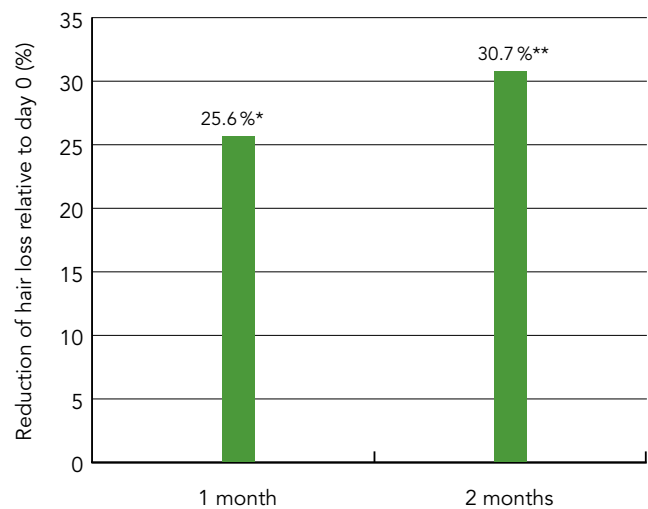
Results suggest that RootBioTec HW significantly reduces hair loss and thus leads to denser hair.

Increased Proliferation of Dermal Papilla Cells



Anti-Hair Loss Effect

1% RootBioTec™ HW



*p=0.018
**p=0.016

RootBioTec HW

Prevents hair loss – ensures fuller hair

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Marketing Benefits

- Hair active with proven efficacy in vivo
- Novel technology (RootBioTec)
- Sustainable sourcing of raw material
- Available in a COSMOS approved version

Innovating for your success

Mibelle Biochemistry designs and develops innovative, high-quality actives based on naturally derived compounds and profound scientific know-how. Inspired by nature – Realized by science.

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