



THE PARADOX OF NATURAL HAIR CARE

Ingredients | Dr. Fernando Ibarra from IOI Oleo explains that finding natural compounds capable of mimicking the natural healthy state of hair is key in improving natural hair care products.

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The growth of natural cosmetic products is still significantly higher than that of any other segment in the cosmetics industry. We have seen this development in mature markets both in Europe and in North America for many years now and the trend has recently been picking up in emerging markets all over Eastern Europe and Asia as well with impressive dynamics. Operating in a niche position, many manufacturers of natural cosmetics started some ten to twenty years ago with a very low market share.

With a repeated double-digit growth during more than a decade in many countries, natural-based cosmetics have reached a market share of between approximately 10 percent and 15 percent¹. The figures strongly depend on the market segment and the definition of “natural cosmetics.”

However, while natural skin care reached impressive figures, the market share of natural hair care products is still insignificant, amounting to only around one percent, even in developed markets. What is the reason for this poor market share although many consumers are willing to switch to natural products? And why can't manufacturers of personal care products participate in this natural trend and get a substantial share from the hair care segment? The answer is simple: natural hair care products do not perform as well as traditional ones do.

Consumers have high expectations on how hair should feel during washing and after rinsing.

These expectations are fuelled by many years of using highly developed, sophisticated hair care products. The key factors influencing the consumers' decision for a shampoo are cleansing performance, such as the foaming and conditioning effect. As far as the cleansing performance and foaming properties are concerned, natural shampoos have come close to conventional ones in recent years. However, the decisive criterion for consumers is the conditioning effect, especially the ease of combing after washing. Following different mechanisms and physico-chemical interactions between the conditioning agents and the hair's surface during shampooing, a softening film will form on the hair. After rinsing, a certain proportion of the conditioning actives must remain on the hair in order to make it soft and facilitate wet and dry combing.

New solutions required

Many high performance conditioning agents and some oils (e.g. argan oil) are known in conventional hair care. They have been studied for many years and their performance is well proven for different quaternised (i.e. permanently positively charged) macromolecules. These classical conditioning agents, many of them known as polyquaternium, are used in large volumes and often combined with silicone oils that deliver long lasting softness to the hair. Unfortunately these materials are not allowed for certified natural cosmetics.

Another issue is the bioaccumulation due to the poor biodegradability of quaternised chemicals and silicones that many consumers no longer want to accept. Finally, the so-called build-up effect limits the manageability of hair since it permanently stays on the hair, making it lose its natural structure. Thus, for various reasons, the formulator has to find new solutions to reach a similar level of performance with a very

EXPECTATIONS

Consumers have high expectations of **how hair should feel** during washing and after rinsing

Natural hair care products do not perform as well as **traditional** ones

In **natural** hair care it is virtually impossible to achieve the same performance of **conventional** hair care

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limited set of ingredients available for natural hair care.

The conditioning performance is normally assessed by combing force measurements and half side testing with a professional panel, e.g. in a hair dresser salon. We have been working with our own and external professional hair care experts on new ingredients and formulations for natural hair care and a lot of testing has been done in our application lab. After various performance tests with different natural conditioning agents we identified one active with outstanding performance. If we talk about outstanding performance in natural hair care, we have to bear in mind that in natural hair care it is virtually impossible to achieve the same performance of conventional hair care. The typical reduction of combing force that can be obtained with high quality conventional shampoos is around 80 to 90 percent while most natural shampoos currently found on the shelves only yield five to 20 percent reduction of combing force, or sometimes even show an increase of combing force as well². With such a poor performance, the hair feels rigid, dry, and has a rough surface which is very difficult (and painful) to comb.

So, if hair care starts with a good shampoo, why don't we take a closer look at ingredients that help improve the sensorial quality?

After analysing the details of the human hair structure, we decided to follow a new route for natural hair care. The hair is comprised of different layers of protein filaments that provide the basic structure. In the inner part ▶

“POLYQUATS COMBINED WITH SILICONE OILS ARE NOT ALLOWED FOR CERTIFIED NATURAL COSMETICS”

Dr. Fernando Ibarra, Business Director Personal Care, IOI Oleo

of the hair — the cortex — there are scales that cover and protect the twisted filaments. This significantly reduces the mechanical stress on the medulla, which is the core of the hair. To reduce friction and its mechanical impact even more, the keratinous scales — the surface of our hair — are covered with fatty acids that are produced in the sebum glands and protect the hair too. The fatty acid layer is hydrophobic and inhibits water uptake that leads to swelling and distortion of the scales on the surface. Mechanical stress, such as combing applied on swollen hair fibres, will destroy and remove parts of the scales on the hair’s surface. In addition to the hydrophobic effect, the fatty acids also have a lubricant effect that reduces this mechanical stress (e.g. when combing the hair)³. We can see that like so many other parts of the human body, our hair has been perfectly designed by nature. So why should we not try

to design a hair care regime that tries to restore the natural state of the hair instead of applying chemical patches on it?

In classical hair care, the good results of the products are achieved with quaternised, usually synthetic polymers that cover larger areas of the hair due to their positive electric charge. We decided to investigate natural compounds that are able to mimic the natural healthy state of hair.

Mimicking healthy hair

We focused on fatty acid derived ingredients that are similar to the ones naturally occurring on our hair (and elsewhere on our body) and on a natural-based chemical moiety that allows an efficient attachment on the hair. We chose to functionalise a natural Omega acid with a naturally occurring amino acid that is first converted into cyclic PCA (a well-known moisturising agent in skin care and which also naturally occurs in

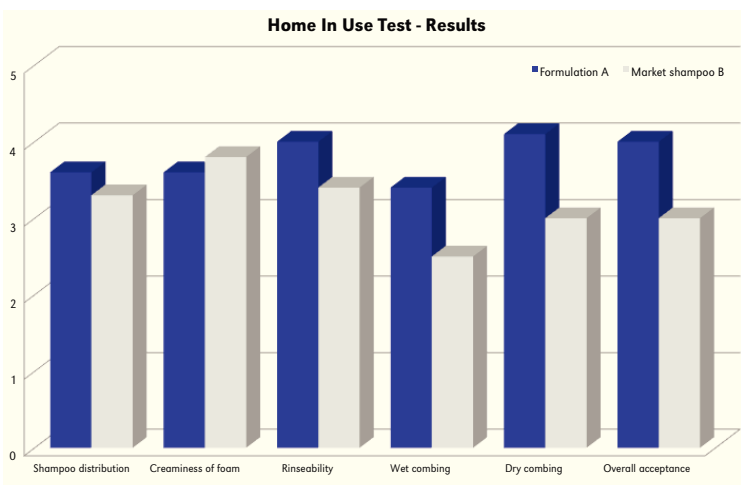


fig. 2: Performance comparison of a typical certified natural shampoo and a basic shampoo formulation with Softisan ConditionHair

our body) and then permanently connected to glyceryl oleate, the backbone of our natural conditioning agent. This resulted in the palm-free ingredient **Softisan ConditionHair** which is 100 percent plant-based as it is derived from sunflower, rapeseed and corn. Since the ingredient is strikingly similar to other natural products (fig. 1*) such as polar phospholipids, it served as a template in the development process.

Both, Lysolecithin (as well as other Lecithins) and PCA Glyceryl Oleate are natural fatty acids that are attached to another natural functional molecule that has a positive charge. This positive charge may be permanent as in Lysolecithin or pH-dependent like in PCA Glyceryl Oleate. However, both follow the principle that a positive charge in the molecule will help to attach to the negatively charged surface of human hair. Once it is there, it restores the fatty acid layer in a natural way and will improve the natural, hydrophobic, and smooth character of the hair.

Lubrication and shine are two attributes connected to the restoration of the fatty acid layer. An assessment of the combability of different shampoos was performed in our application laboratories with a trained hair care expert as well as with typical consumers. The results of basic, non-optimised shampoos containing **Softisan ConditionHair** were compared to typical market samples, and a placebo formulation without conditioning agents. Commercially available certified natural shampoos were additionally tested for comparison.

The results of a home test with 12 volunteers show that test shampoo containing 0,7 percent of our conditioning agent performed better than a typical certified natural shampoo, see fig. 2. The results of the combing assessment clearly indicated that the commercially available shampoo shows a poor effect on the combing per-

PREFERENCES

Key hair care preferences: cleansing performance, foaming and conditioning effect

The cleansing performance and foaming properties in natural shampoos has **improved in recent years**

PERFORMANCE

Reaching a **similar** level of **performance** with a **limited set of ingredients**

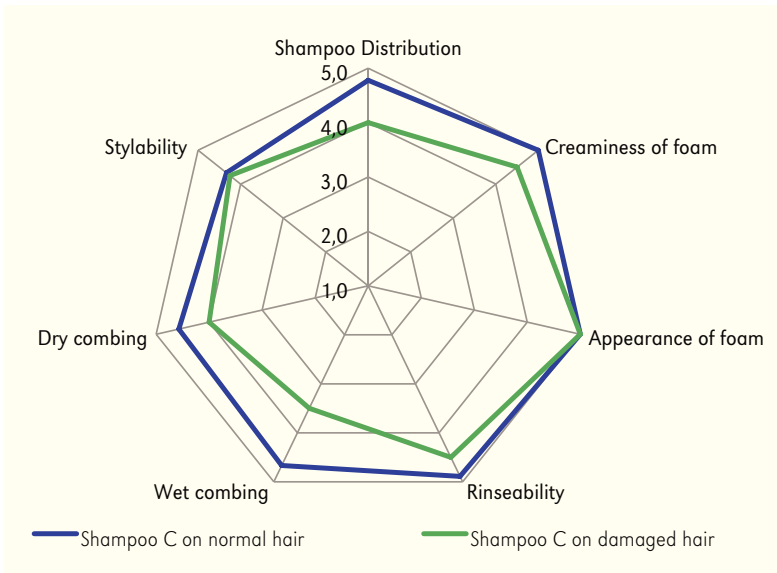


fig. 3: Performance of a shampoo containing a combination of Softisan ConditionHair and Miglyol Coco 810 on normal and damaged hair

formance and smoothness of the hair. Our conditioning agent clearly managed to reduce the combing force and thus showed a superior performance, even in a simple lab formulation. We also wanted to find out how the product performs under real life conditions and in professional use and whether we can improve the performance in an optimised formulation. A professional hairdresser evaluated the sensorial profile during shampooing and performed combing experiments to assess the quality of our lab shampoo. The feedback on the performance (tested on sixteen volunteers) both on healthy and damaged hair, was very positive. As expected, the performance on healthy hair was rated higher. However, the positive results are comparable to the performance of conventional products. In the optimised formulation, the combination of 0,7 percent of our conditioning agent with 0,5 percent of **Miglyol Coco 810**** showed remarkable efficiency as conditioning agents. Even on damaged hair, the assessment of a professional hair dresser showed a very good performance of the tested shampoo tested on sixteen volunteers, see fig 3.

Softisan ConditionHair with its functionalised long chain fatty acid is characterised by its good film forming properties on the hair. It can be easily formulated in emulsion bases and all kinds of conditioners. Usually oils such as **Miglyol Coco 810** do not stay on the hair and instead wash away when rinsed off. The positively charged **Softisan ConditionHair**, however, adheres to the surface of the hair, restores the natural condition of healthy hair, and creates a thin lipophilic film that other oils can attach to by Van der Waals forces. The oil used in our formulation improved the effect of our conditioning agent by completing the film forming and smoothening effect on the layer formed by the primary conditioning agent. First used in skin care, the application range of **Miglyol Coco 810** was quickly broadened and has shown to have a very good effect on hair in combination with other natural conditioning agents.

Natural hair care ... to be continued

The positive results of the natural conditioning shampoos show that one big hurdle has been completed. But still, the average consumer who is used to con-

The **market share** of natural hair care products amounts to only **one percent**

Conventional shampoos reduce the **combing forces** by up to 90 percent, natural ones by up to 20 percent

QUALITY

In natural hair care the **quality of ingredients** is improving

Bioaccumulation due to the poor biodegradability of quaternised chemicals and silicones are **no longer acceptable**

ventional shampoos will not be entirely happy. Further steps in natural hair treatment are needed to achieve the same quality as conventional hair care products. The two-in-one philosophy of convenience products is easier to achieve without the limitation of natural hair care ingredients.

A good strategy is to separate the washing process from treatment of the hair and offer a series of shampoo and rinse-off or leave-in hair conditioners. In such concepts, surfactants do not prevent natural conditioning agents from forming an effective conditioning film on the hair. Our application lab offers suitable formulations and support for developing shampoos and conditioning products. In natural hair care the quality of ingredients for hair care is improving. The effectiveness of hair care products has not yet reached the quality of conventional hair care products, especially in the field of professional hair care, but the gap is becoming smaller. With the help of new ingredients, combinations of conditioning agents such as the ones presented here, and when a hair care range consisting of shampoo and an additional treatment is applied, it is possible to obtain results similar to that of conventional hair care products.

Reduced combing resistance

The key criterion for good hair care performance is the reduction of combing resistance. We proved the hair conditioning properties with the help of combing assessment performed by trained experts. Both, tests on commercially available hair tresses as well as salon performance tests with volunteers with various hair types showed that the combination of **Softisan ConditionHair** and **Miglyol Coco 810** provides an effective performance. □

*The comparison of two chemical structures (fig. 1), the reference list and additional information can be found on the Internet – see download panel

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