

## Are Naturals Superior to Synthetics?

SITARAM DIXIT

Senior Manager — Fragrance Applications.  
International Flavours & Fragrances India Ltd.

The word natural conjures in us, all the goodness of life, namely, cleanliness, purity, and freedom from contaminants, prevalent in our environment. Natural, to some, means green fields, meadows, fresh air, unspoilt beaches, even land surface, and other pleasant god gifted images, even though unpleasant ones also exist in the form of earthquakes, floods and famine.

The cosmetic industry sells dreams and the absurdity of the word natural is evident more in this field than anywhere else. In the last 15 to 20 years it has become fashionable to incorporate a couple of plant ingredient in cosmetics and market it with a natural or herbal brand halo to make big money. The consumer seeing all the marketing and promotional jargon invokes images of exotic plants and believes he has a better product than the one he is currently using.

Anything natural is good, is a statement to be taken with a pinch of salt. However, one cannot dismiss the statement, as ancient civilisations have proven their skills to cure illness and enhance the well being of consumers using natural plant ingredients. Let us not forget that this was possible to the ancients without the help of any modern science and technology we have now at our disposal.

Egyptian civilisation made extensive use of natural oil for curing illness, and enhancing self-esteem of users using the art of aromatherapy. Ancient Chinese claimed to cure almost every medical illness known to humans at that time by use of herbs and natural plant ingredients. Vedas, the earliest records of ancient India, notably the *Atharvaveda*, *Smritis*, and *Samhitas* details the ayurvedic school of medicine — a comprehensive system that elaborates the use of herbs to heal and revitalise human body systems for healthy living.

Today, we have the benefit of modern science and technology, but can we ignore and disregard the achievements made by our ancestors in earlier times?

Plant kingdom contains a wealth of chemical substances, inert, simple, and some complex, having a range of biological activities. It is up to us to make use of the materials in a beneficial manner; otherwise the very same natural activity can also cause injury and be fatal. Cosmetics incorporating natural ingredients to sell benefits can be even a dream, but not misfortune or loss and be a nightmare to both the consumer and the manufacturer.

The appearance of natural cosmetics and toiletries as a mass-market product was considered more as a short-term marketing strategy to sell on an emotive platform than the accrued benefits by the actives added. These products have however, continued and likely to stay. How much of them are truly natural and beneficial?

We know that natural products contain natural plant extracts and ingredients that claim to deliver benefits. Are these claims true or are they only marketing claims? We know that brands selling under the natural and herbal umbrella are popular. However, let there be no doubt that in today's competitive marketplace manufacturers making efforts to reduce consumer cynicism by scientifically demonstrating the benefits that one can derive by using natural ingredients will only succeed.

From time immemorial, people have used cosmetics and lotions to decorate body and face. Women used belladonna extract in earlier times to dilate the pupils of their eyes and enhance their attractiveness. We understand today that the active ingredient of belladonna, is "atropine", a very toxic chemical having a range of pharmacological properties. Over the years with experience and expertise, our ancestors invented different methods to use actives in plants effectively and produce the necessary benefits without the underlying adverse effects.

When considered analytically, the safety margins earlier were much lower than demanded as minimum necessary in today's times. We are aware of various

natural substances that are potentially harmful and have an adverse reaction to our health. A good example is plants belonging to the citrus families. Lemon, Lime, extracts contains substances, which are phototoxic.

When applied on skin they are safe, but when exposed to sunlight they cause severe skin irritation and burns. Skin sensitizer, is common among plants. Geranium, dandelions, etc are other examples. Cinnamon is a traditional food-flavouring agent considered safe if used in moderation. However, when applied to skin it is potentially dangerous, inducing a high level of allergic dermatitis.

Natural products from all parts of the world are available. The beneficial effects of naturals are based on folklore and are generally described in flattering language. The original information on the use of natural ingredients in a formulation, especially the dosage levels at which it is effective is lost with the passage of time. A substance, traditionally, may be said to be effective for a particular condition. However, vital data regarding the vehicle to be used and the dosage required may not be available. Natural products offered for use in cosmetics have names with only an aura of it being exotic and beneficial.

Ideally, a product should be sold only when it is formulated to substantiate advertising claims without compromising consumer safety. This is possible only if the benefit and risks of using a natural ingredient in a product is carefully assessed and critically analysed.

Typically, some vital information about a natural ingredient is essential before its use in product formulae.

- Intended use and dosage.
- Source of the natural ingredient.
- The method used in the isolation of the active.
- The variability in the composition.

The product development team along with the marketing team jointly clarifies and concludes on the type of claim, the use of natural, and the product in which it is to be added. The dosage level required to substantiate claims is also identified.

Obtaining ingredients according to specifications is the most difficult task. A simple plant name can account to different plant species. Cedar wood oil can be obtained from at least eight different species of cedar tree. It is difficult to identify the actual plant species from which the oil has been extracted. Sometimes the same active may be obtained from different parts of the tree, e.g., root, bark, leaves, flower, seed, or kernel. The chemical composition naturally varies. It will also have different toxic properties. Castor oil is obtained from castor beans. When castor oil is extracted some amount of toxic chemical, "ricin", is also extracted. Proper extraction procedure however can ensure extraction of castor oil without any "ricin", content also.

Active ingredients from plant parts are normally extracted by pressing, distillation, or solvent extraction. Extracts obtained from these different processes can be of varying quality and properties. Thus plant extracts have variable compositions that may also contain contaminants, either intentional or ones that are naturally found. In addition, it can have preservatives, anti-oxidants, diluent, and other additives, whose details are necessary before use in the product formulation.

Plants are sometimes contaminated with pesticides, heavy metals, other plant species, e.g., lichens, and metal contaminants from extraction vessels. Dark coloured plant extracts are sometimes bleached and that can alter its composition and properties. Sometimes plant extracts may simply be adulterated with synthetic constituents or with other natural plant extracts that having similar properties.

Good manufacturing practice and superior hygiene levels are necessary during production of a natural ingredient. In lieu of hygiene, use of excessive preservatives and anti-oxidants to prevent microbial growth can compromise the safety of the formulated product, due to excess chemicals being present and in addition unwanted remains of the killed microbes. The microbial status of the natural plant extract thus becomes a criterion of paramount importance.

Another important fact that cannot be ignored is the quality of solvent used in the extraction process and its toxicity profile. Only if the toxicological review of a natural ingredient is favourable should it be considered

for use in the formulation. The toxicologist should be aware of all the various stages necessary in the development of a natural ingredient based cosmetic product, otherwise the wonder material added can give an unpleasant magic surprise. It is also equally important to give proper attention on how the natural ingredient is used and whether the specific formulation can increase or decrease the bioavailability of the active. The toxicologist monitors any incidence and type of adverse reaction to the formulation. This evaluation is necessary so that if any adverse reaction is seen, we can consider revising the formulation and if necessary discontinuing use of the active.

Mineral substances — talc, clays, etc. — which are mined and used in cosmetics, are natural. Talc deposits were formed in the crust of the earth by changes caused on certain rocks under the influence of heat, atmosphere, pressure, and water. Thus, talc often contains other minerals such as quartz, chlorite, dolomite, magnesite, calcite, specks of mica and ultrabasic silicates having a chain silicate structure like amphiboles that include termolite, anthophyllite, actinolite, etc. Strictly speaking, these impurities cannot be called contaminants since they were present in the mineral and not added or introduced later while milling or transport. However, these accessory minerals are referred to as impurities as their presence is potentially harmful when present in talc for use in a body talcum powder. Amphibole, when detected in talc deposits, is considered unacceptable for cosmetic use. Chrysolites, that belong to the same class of impurities as asbestos, a sheet silicate, should also be absent in talc for as cosmetic use.

Quartz contamination even in trace amounts could give gritty talc that would be technically unacceptable. Chlorites are structurally similar to talc having similar properties. However, substitution of some Magnesium ions in the crystal lattice by aluminium and/or iron results in undesirable green colours not suitable for talcum powder.

Carbonates such as dolomites, calcite, magnesite, and phosphates like apatites are other major contaminants in talc and due to the lack of a platy structure, they reduce the quality of talc if present. Their presence can also affect the perfume integrity due to their potential reactivity with perfumery ingredients. Naturally occurring rutile titanium dioxide is often present in the crystal lattice of Magneite or iron oxide that are

dark coloured and gritty and are undesirable in talc for cosmetic use. The different mineral ingredients used in a talcum powder may vary in microbial population. The source of contamination may be through direct faecal residues from animal sources and soil or indirectly from contaminated water. For general use in cosmetics, treatment is essential for reducing the total microbial population to levels approved by the regulatory authorities.

Treatment may be carried out either by dry heat, steam, ethylene oxide or gamma irradiation. The efficacy of the procedures should be monitored routinely. Treatment with ethylene oxide may result in residues of the gas or its by-products that have to be effectively controlled.

Natural cosmetics are high on the agenda of marketers for some years. Terms like 'Bio', 'Natural', 'Eco', 'Herbal', 'Wonder Ingredient', etc., have become common. Beauty products made from naturally occurring substances or nature identical ones that promise natural goodness effects are increasing in the market. Are the herbs effective in achieving the claim?

The claims made by herbal products for herbs topical effect rarely mentions the amount it is to be applied or any conclusive clinical studies were carried out with it. Can we morally glorify the goodness of herbal ingredients in a cosmetic when it is available in quantities possibly not enough to have any effect? Are not these products selling only dreams? Should we rush to buy cosmetics only because it incorporates some herbal or natural materials?

There is no doubt that good formulated functional products will not make the skin better, more comfortable and protect it from hostile environment. It is also possible that the promise made by clever advertising only makes the consumer feel that a special wonder herbal ingredient is more effective, when in fact it only has a placebo effect. The world of natural ingredient is huge and exciting to be beneficially used. It is for all of us as consumers to question and understand the rationale behind its usage in a product so that in reality it enables us lead a better quality of life.

This takes us back to our question. Are all naturals superior to synthetics? You answer.