

Sunshine, Suntan, and Sun-Sensitizing Oils

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It's summer time in the Northern Hemisphere and time for sunshine and suntans. This is a time also to be aware that certain essential oils can promote sunburn.

Such oils are said to be phototoxic. If applied directly to the skin followed by exposure to sunlight or a tanning light, the molecules of these oils amplify the ultraviolet (UV) portion of the spectrum and can cause long-term, even permanent, skin discoloration as well as severe sunburn.

It is sometimes said that all citrus oils are phototoxic, but this is not true. Among the citrus oils that are expressed (cold-pressed) from the rinds, some are phototoxic and some are not. Among citrus oils distilled from the rinds, none are phototoxic. However, distilled citrus oils are rarely used in aromatherapy because they are less aromatic and do not possess the therapeutic properties of the expressed oils. Distilled citrus oils are mostly used for flavorings.

The common essential oils considered phototoxic are as follows:

Angelica (Angelica archangelica)
Bergamot (Citrus bergamia)
Bitter Orange (Citrus aurantium)
Grapefruit. (Citrus paradisi)
Lemon. (Citrus limon)
Lime (Citrus aurantifolia)
Petitgrain (Citrus aurantium)
Rue. (Ruta graveolens)

Some authorities would also include fennel (*Foeniculum vulgare*), anise (*Pimpinella anisum*), and cumin (*Cuminum cyminum*) on this list, while others omit grapefruit oil (*Citrus paradisi*), which is considered only mildly phototoxic. Notice that the list does not include all of the citrus oils, only some of them.

According to Tisserand and Balacs in their book, *Essential Oil Safety*, the expressed oils of Mandarin (*Citrus reticulata*), Sweet Orange (*Citrus sinensis*), Tangelo (*Citrus x hybrida*), and Tangerine (*Citrus nobilis*) are not phototoxic. Neither are the distilled oils of lemon, lime, and grapefruit, even though their expressed oils are. Neroli oil (*Citrus aurantium*), extracted from blossoms of the bitter orange tree, is also non-phototoxic while petitgrain distilled from the leaves of the same species is phototoxic. (Note that petitgrain is listed above while neroli is not.)

The Chemistry of Phototoxicity

The chemical constituents responsible for phototoxicity in oils are all furanoids. Furanoids are compounds containing a group of four carbon atoms, four hydrogen atoms, and a one oxygen atom configured in the shape of a pentagon (five-sided) called the furan ring. Compounds incorporating a furan ring into its molecular structure are called furanoids.

Furan rings have the unique property of having dimensions that can resonate with the frequencies of ultraviolet light, thus amplifying the rays of sunshine that cause burn, discoloration, and damage to the skin. Oddly enough, under the right circumstances, furan compounds can also cancel the UV portion of the spectrum in a way that absorbs solar energy, steps down the frequency, and dissipates it harmlessly as heat. In these instances, the furanoids are not phototoxic but, instead, act as sun screens offering protection from the destructive rays of the sun.

Whether a specific furanoid compound acts as an amplifier or a destroyer of UV energy depends on the structure of the specific compound as well as the other companion compounds in the oil that may quench its phototoxic tendencies. Hence, one cannot just list all of the essential oils containing furanoids and say whether they are solar-toxic or solar-protective. Some with the highest concentrations of furanoids are protectors while some with much smaller amounts are toxic.

The oils with the highest concentrations of furanoids are myrrh (*Commiphora myrrha*) containing 23% furanoids, fleabane (*Conyza canadensis*) with 8%, and peppermint (*mentha piperita*) with 5% - none of which are phototoxic.

Bitter orange oil (*Citrus aurantium*) contains 4% furanoids, lemon (*Citrus limon*) 2%, and lime (*Citrus aurantifolia*) also only 2%, yet all three of these are definitely phototoxic. The most phototoxic of oils of bergamot (*Citrus bergamia*) expressed from the rind and yet it contains only 3% furanoid compounds.

These differences lie in which variety of furanoid is present. The most hazardous type of furanoid is a class of compounds called furanocoumarins. Yet, even furanocoumarins can be quenched with the right companion compounds.

Another factor is the other compounds that comprise the rest of the oil. Some types of compounds, such as sesquiterpenes, can make unruly compounds behave. When one compound mitigates the negative characteristics of another compound, this is called quenching. In some circumstances, quenching compounds can make phototoxic compounds photosafe.

Because of the complexity of the causes of phototoxicity and possibilities for quenching, one cannot simply look at a chemical analysis of an oil and know if an oil is photosafe or not. The best advice is to go by a list, such as the one given above that is based on actual experiences people have had with the oils.

Myrrh: Breaker of all the Rules

Myrrh (*Commiphora myrrha*) is a puzzle. It contains at least ten types of furanoid compounds (20-27%), more than any other oil-yet it is not phototoxic. Many ancient Egyptians, who lived under the intense tropical desert sun, applied myrrh oil on their skin daily without sunburn reactions. In fact, the cones seen on the heads of figures in Egyptian hieroglyphics were fat saturated with myrrh allowed to melt slowly and run down over their bodies as a protection from the sun and as a repellent to biting insects, as well.

Queen Esther of the Old Testament (Esther 2:12) was massaged daily with liquid myrrh for six months prior to her marriage to the king and apparently suffered no ill skin effects from sunlight. In fact, myrrh seems to act more like a sunscreen, protecting the skin from

ultraviolet light instead of increasing its sensitivity to burn. Yet it contains major quantities of furanoids.

Evidently, there are compounds in myrrh (perhaps the sesqui-terpenes) that mitigate or quench the solar amplifying properties of the furans. In fact, the quenchers in myrrh cause the furanoids to resonate in such a way as to dissipate UV energy in harmless forms (like heat), thus offering sunscreen protection-the opposite of phototoxicity.

What if I Put Lemon Oil in my Drinking Water and Sit in the Sun?

Phototoxic oils pose problems only if applied to the skin followed by exposure to a source of ultraviolet light. Even when the phototoxic oil is diluted in a neutral carrier oil, it can still cause phototoxic reactions when applied directly to skin exposed to sunlight. There is no risk of phototoxic reactions unless oils have been applied directly to the skin.

Using phototoxic oils for flavorings in food and drink poses no hazard. It is only on the skin that there is a problem. So don't worry if you like a few drops of bergamot or lemon in your drinking water while you sunbathe. Just keep it off of your exposed skin.

Most authorities recommend waiting twelve hours following an application of phototoxic oils to the skin before exposure to sunlight or the UV radiation of a tanning booth. This would be true even if one tried to wash them off since they almost immediately penetrate deep into the skin, beyond the touch of soap and water. Applying oils with furanocoumarins after sundown, before going to bed, poses no problems then or the next day, provided one is not retiring to a tanning bed that evening.

One can go out into sunlight after applying phototoxic oils if the parts of the body receiving the oils are well covered with clothing. That would be sufficient protection.

People with fair skins are more susceptible to phototoxic reactions than those of color. In fact, experiments have shown that with a person of brown or black skin it takes up to seven times more oil with furanocoumarins to elicit a phototoxic response than with a Caucasian. A suntan gives a white person some increased protection.

What about the Potential Phototoxicity of Blends?

The table of essential oils considered phototoxic given above is a list of single oils. If a phototoxic oil is included in a blend of oils, the blend will also be phototoxic. Young Living blends containing phototoxic components (usually citrus) include Gentle Baby®, Joy®, White Angelica®, Citrus Fresh®, Thieves®, RC®, and several others. Read the labels.

So enjoy your oils and the summer sun, but don't get burned. A word to the wise is sufficient.

NOTE: Information for this article was taken from the book:

The Chemistry of Essential Oils Made Simple (God's Love Manifest in Molecules) by David Stewart. Copies available from Essential Science Publishing at 800-336-6308 (www.essentialscience.net) or from CARE 800-758-8629 (www.RaindropTraining.com), or on Amazon.com as well as in many bookstores.

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