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THE FIRST TRULY INDEPENDENT WATCHDOG FOR THOSE  
WORKING WITH NATURAL AROMATIC MATERIALS

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**Set out below are a sequence of articles, hastily penned by Cropwatch, in response to the regulatory threat from the EU to the future use of citrus oil ingredients in cosmetics. This arises from alleged photo-toxicity concerns surrounding the inherent furanocoumarin (FC's) content of citrus oils and other natural products. The matter currently remains unresolved / awaiting time within Brussels. The paucity of available information on FC contents in natural aromatic ingredients led to the publication of the huge Cropwatch Furanocoumarins in Natural Products A-Listing (see separately on this website).**

**1. ....§6. Citrus Oils and Furanocoumarins; Update.  
from *Cropwatch Newsletter June 2007.***

Cropwatch has been invited to a meeting with the European Cosmetics Commissioner on the furanocoumarins in cosmetic ingredients issue on July 3<sup>rd</sup> 2007 in Brussels. In a separate development Cropwatch understands that RIFM contracted Prof. David Kirkland of Covance Ltd. UK to carry out studies on photoclasticity studies on isopimpinellin & bergamottin on their behalf, using samples obtained from Extrasynthese (RIFM 2007), and, presumably this work has been submitted by RIFM to the SCCP by the end of March 2007 deadline. We would be negligent if we did not point out that the New Jersey based-Covance animal testing company has been the subject of video-evidenced animal cruelty allegations by PeTA in their Vienna, Va. establishment (see [http://blog.peta.org/archives/2007/04/covance\\_payspe.php](http://blog.peta.org/archives/2007/04/covance_payspe.php)), and similarly by BUAV in their investigations into operations at Muster, Germany in 2004 (see <http://www.buzzle.com/editorials/1-17-2004-49549.asp>). Altogether, we regard Covance as a pretty strange choice of a research partner by RIFM, the latter being an organisation representing an industry which should be particularly sensitive about its public image wrt the use of animals in ingredient safety testing.

Although IFRA/RIFM officials never answer our mail enquiries, when Cropwatch contacted Prof. Kirkland of Covance UK for details of the photoclasticity contracted work, he was gracious enough to explain why he had to decline, even though we had politely pointed out this was a public interest health & safety matter. The RIFM scientific report indicates that Kirkland found that bergamottin provided a photoclastic response (structural chromosome aberrations) significantly above background at all concentrations tested in the presence of UV light, whereas isopimpinellin induced aberrations not significantly different from the controls. Unless RIFM allow Kirkland to publish the work, or the SCCP publishes the entire work itself, then presumably the exact details of this work will remain hidden from public scrutiny. Whilst deliberations on isopimpinellin & bergamottin continue on behind closed doors, Cropwatch has been seeking industry's opinions on the furanocoumarins issue. Our broad findings are as follows, which we make no apologies for expressing in the plainest of terms. 1. The perfumery industry needs the citrus industry more than the citrus industry needs the perfumery industry (on the principle that citrus oils are by-products of the beverage industry).

2. A number of major players amongst aroma ingredient producers already have the technology to reduce or partially reduce FC levels in citrus oils for the flavourings market, and are quietly happy to have a market advantage over the smaller concerns which haven't been able to afford the investment in the required technology.

3. These major players (see 2 above) appear to dominate policy (& research) within the major essential oil organizations.

4. These same major players (see 2 above) are, in principle, happy to provide FC level data for their citrus ingredients to their customers, but not, in general, to impart this information to the public domain.

5. Our perception of supplier's attitudes is that they feel that customers (i.e. perfumers & technical formulators) have not created a 'demand climate' for ingredient FC data. As you can see we have found a situation dominated by the self-interests of big industry, where there is a real probability of financial discrimination against smaller industries if legislation restricting FC levels in cosmetic ingredients is passed by EU legislators. The views of small producers are unrepresented, and, as usual, nowhere in this equation are socio-economic or ecological factors addressed by either industry or EU regulatory officials, who are tunnel-visioned on the 'safety' aspects only.

## **Reference**

RIFM (2007) RIFM Scientific Report May 2007.

## **2. Citrus Oils in Cosmetics – The Crisis Deepens. *Cropwatch Newsletter May 2007.***

### **Recap & Update on the Citrus Oil Crisis.**

Whilst new 2007 perfume industry launches continue to prominently feature citrus notes, especially in a new range of colognes, the EC Cosmetics sector regulators are still taking steps to effectively prohibit the use of traditionally prepared citrus oils in fragrances. In a letter to Cropwatch of 26.04.07, copy attached, Head of Unit Sabine Lecrenier denies all FC's will be banned, but then goes on to specify six furanocoumarins (FC's) which will (the list now apparently includes angelicin), because they are allegedly linked with photo-carcinogenic potential. These six (psoralen, angelicin, bergapten, xanthotoxin, oxypeucedanin and epoxy-bergamottin) are all found to a greater or lesser extent in the major citrus oils used in perfumery, and are to be regulated to 1ppm concentration in finished cosmetics. The case against the carcinogenicity of individual FC's, as presented in previous SCCP Opinions such as SCCP 09542/05, remains scientifically non-robust, and there is a lack of supporting knowledge, understanding & experimental & technical data. For FC's occurring in natural aromatic products, matrix effects & the anti-carcinogenic potential of other co-occurring substances remain unclear.

The restrictive legislation proposed by Lecrenier *et al.* as described above is actually unworkable since no comprehensive data on the distribution of FC's across the range of perfumery ingredients, citrus or otherwise, is available in the public domain, merely scrappy bits of information. In any case, any minutest health risk which might be present to fragrance-wearing consumers is best approached by labeling, advising the wearer to avoid actinic light for 12-24 hours after application.

Most disappointingly, whilst health risks from FC's in cosmetics remain so minute as to be virtually incalculable (provided reasonable precautions are taken), Lecrenier *et al.* seem to have completely ignored the catastrophic effect to the perfumery art of effectively removing citrus ingredients from the perfumer's palette, as outlined in Cropwatch's April 2007 Newsletter. Many have likened this threat to culture as a parallel situation to the burning of books by Nazi-sympathising students on by May 10th 1933, but we have yet to hear anything on the subject from Brussels, apart from repeated invitations to submit evidence on 'the safe use' of FC's in cosmetics. The latter isn't likely to happen since the research required is complex, extensive & time-consuming and requires sophisticated & expensive equipment & substantial funding, but because industry has failed to come up with the appropriate data, it is being 'punished' with a blanket restriction (read ban) on FC's in cosmetics. This outcome is a childish & unprofessional response - we need regulators who can work with industry at a technical level to find a way forward in a difficult situation - or resign.

### **Cropwatch Takes Action.**

According to our information, it seems to be the case that no aroma-connected organisation we have contacted is able to maintain a satisfactory technical

dialogue with the EC Cosmetics sector regulators, and indeed, leading figures of some well-known organisations have voiced this fact publicly at professional gatherings. The problem is, therefore, not so much what we do about FC's in citrus oils. The problem is what we do about a non-communicative Brussels regulatory machine, which is imposing unnecessary, costly & unworkable cosmetics regulation.

Cropwatch is therefore carrying out the following courses of action:

1. A copy of Cropwatch's (longish!) reply to the latest mail from the Cosmetics Head of Unit (see attached – & please read) is already forwarded to the EU Ombudsman. The content not only deals with the FC issue, but lists out a number of Cropwatch's points & arguments that have been consistently ignored although we have made some of them several times.

2. We have additionally asked the Cosmetics Head of Unit for a status report on a promised review of the SCCP (see mail attached), which Cropwatch has extensively argued is 'not fit for purpose'.

3. Cropwatch is currently negotiating with other aroma-connected organisations to unite on issues connected with the restriction of natural ingredients, and lack of technical dialogue with regulators. Cropwatch is actively seeking to establish an office, or at least representation, in Brussels.

4. Following on from (3) above, the water is being tested for a Europe-wide vote of no confidence in the EU Cosmetics regulators, as they have failed to take the appropriate measures & strike the correct balance in ensuring the safety of cosmetics to the general public..

5. Proposals to launch ***The Campaign for Real Perfume***, as mentioned in the April Cropwatch Newsletter, are being circulated to natural perfumery companies, green-image orientated cosmetics companies etc., and we are already in negotiation with interested parties (if interested please contact Cropwatch at [info@cropwatch.org](mailto:info@cropwatch.org)).

6. Cropwatch staff are now accepting lecturing engagements on 'regulatory madness' issues surrounding natural aromatic ingredients. So far the following have been accepted:

12<sup>th</sup> Sept 2007: 38<sup>th</sup> ISEO Conference, Graz, Austria.

6/8<sup>th</sup> Nov 2007: WFFC Meeting, Saddle Brook NJ., USA (provisional)

All other issues are held over until the next Newsletter in view of the seriousness of the FC issue.

Tony Burfield

On behalf of Cropwatch.  
[www.cropwatch.org](http://www.cropwatch.org)

### **3. Citrus Perfumery Ingredients Now Set to Disappear.**

*Cropwatch Newsletter April 2007.*

#### **§ 1. Executive Summary.**

Banning citrus oils from perfumes would be a drastic move from which perfumery would never recover. But according to a communication written on 4<sup>th</sup> April 2007 by Sabine Lecrenier, Head of Unit for the Cosmetics Sector to Cropwatch (attached to this newsletter), this unthinkable step is precisely the outcome which the EU Cosmetics regulators have decided upon – by placing a restriction on certain furanocoumarins (FC's) such that their content in finished cosmetics cannot collectively exceed more than 1 ppm, in line with the previous recommendations of the 2001 SCCP Opinion & SCCP Opinion 0942/05. In our view, this once more confirms the Brussels 'anti-naturals' fragrance ingredients machinery is operating in over-drive, becoming a vendetta of scandalous proportions.

In spite of the fact that this is potentially the most serious situation that the perfume trade has ever faced, any open resistance to this move is likely to be weak. The (confessed trade independent) SCCP / DG Entr. personnel do not have an authoritative overview of the fragrance industry and do not fully comprehend the implications of the regulations that they help impose on the cosmetics trade. IFRA and EFFA are part of the problem too, becoming alarmingly right-wing/authoritarian and threatening member companies with severe measures if they do not follow their Codes of Practice, which feed into the EU Cosmetic Directives. A non-scientific Cropwatch survey of the attendance of professional perfumery organization meetings (UK / US) shows a membership increasingly dominated by regulatory affairs personnel rather than perfumers – the significance of these measures on the perfumery art will be totally lost on these types of technical employees. And as we have previously proven, the trade press is largely loyal to IFRA and panders to the interests of corporate dinosaurs, and not to interests of cosmetics consumers. The trade essential oil organisations have angered many essential oil producers by their obedient submission of technical data to EU regulators, which has enabled progressive forms of restrictive legislation to be passed against the very trade that they are supposed to represent.

It may very well be the case that industry as a whole chooses to ignore this legislation as being completely destabilising & unworkable, but Cropwatch has to work on a worst possible scenario, and therefore we consider that it is only the sophistication of the fragrance consumer lobby itself which offers any real hope of true resistance & reform. Cropwatch is therefore launching the '**Campaign for**

**Real Perfume'** and hoping for consumer support to counteract what we have to see as philistine regulatory crimes against the perfumery art.

## **§ 2. A Brief Historical Note on Citrus Oils in Fragrances.**

Citrus oils are absolutely vital ingredients in perfumes. Citrus colognes were originally constructed by immersing various plant materials in alcohol, the alcohol concentrated by distillation, distilling the major part off (often down to one third of the original bulk), and citrus and other oils were added e.g. as in the popular fragrance type: Millefleurs. These early perfumes were somewhat unstable and prone to oxidation due to the high monoterpene hydrocarbons content (Simonis 1984), but the development of concentrated & terpeneless citrus oils was said to overcome these problems.

Unless specifically treated, many essential oils derived from species of the Apiaceae & Rutaceae (including citrus oils, angelica & a few others) will contain a furanocoumarin (FC) content – apparently even those labeled “FC-free”. Although FC’s may be associated with beneficial properties in specific situations, there are concerns that some may be associated with photo-toxic &, some suggest, possibly photo-carcinogenic reactions, although this situation is hardly new. To our certain knowledge people have been putting perfumes containing FC’s on their skins for more than 600 years – for example the lemon peel & angelica containing (and therefore FC containing) Carmelite Water was formulated in 1379 at Abbaye St. Juste. Certainly by the mid 1500’s citrus oils were widely produced & used for fragancing such that individual fragrances based on mixture of citrus oils were developed (e.g. Eau de Carmes), and by 1709 we have the example of major citrus oil perfume deployment in Eau de Cologne (“4711”) by Gian Paolo Feminis, the story of which needs no introduction from us. Slightly later, the use of citrus oils is demonstrated in Eau Impériale (Guerlain 1861) – created by Guerlain for Emperess Eugenie (wife of Napoleon III). Nowadays many publications recount the early uses of these materials in the perfumery art, such as that of Burfield (2002) & Williams (2004). Felix Buccellato wrote an excellent review of the importance of citrus oils to the development of Western perfumery over the last eight of nine decades which can be found at [http://www.fmi.bz/citrus\\_oils\\_in\\_perfumery.htm](http://www.fmi.bz/citrus_oils_in_perfumery.htm). Cropwatch attempted to put together what we commonly know about the FC content of fragrance ingredients at <http://www.cropwatch.org/newslet3.htm>.

## **§ 3. The Regulators Plot Together.**

According to IFRA's recent information letter (IL 722) of March 16<sup>th</sup> 2007, DG Entr. will ask the SCCP for an updated Opinion on whether 1ppm of the furanocoumarins psoralen, bergapten (5-methoxypsoralen or 5-MOP), xanthotoxin (8-methoxypsoralen or 8-MOP) and angelicin, determined either individually or in combination, is safe in cosmetics.

New and separate data for isopimpinellin (5,8-dimethoxypsoralen) & bergamottin, it is understood, is also being considered by the SCCP, but data for oxypeucedanin and epoxy-bergamottin is not being presented, apparently due to lack of test material of the appropriate purity (read this as the industry failing to cough-up enough of the appropriate purified samples for studies).

#### § 4. Sabine Lecrenier Reports to Cropwatch.

§ 4.1 Lecrenier for the EU Cosmetics section reports in her 4<sup>th</sup> April 2007 letter to Cropwatch (attached), that the intention to restrict bergapten (5-MOP) and xanthotoxin (8-MOP), either individually or additively, to 1ppm in finished fragrances, even where naturally present, **has already been decided**. This is a breath-taking decision which will, for example, affect many suppliers & end-users of expressed, distilled and supposedly FC-free citrus oils.

§ 4.2 Lecrenier also reports that the same remarks also apply to psoralen and angelicin, although:

“...for angelicin, we may consider it differently in view of the results of the public consultation of the Committee on herbal medicinal products on this substance. I enclose the hyperlink to this consultation (<http://www.emea.eu.int/pdfs/human/hmpc/31791306en.pdf>) A new consultation of the scientific committee may thus be necessary.”

*[Cropwatch comments: This is surely ‘clutching at straws’ – the above cited report merely reflects on the lack of knowledge, understanding & studies in the photo-carcinogenic area, and on the situation wrt taking (daily) oral herbal preparation(s) containing FC’s – which cannot be directly comparable to an occasional or a one-off dermal fragrance application containing FC’s].*

§ 4.3 Lecrenier also refers to new studies by ‘part of the industry’ on isopimpinellin & bergamottin which are apparently being presented by April end 2007, although we are apparently not allowed to be party to them [*the SCCNFP previously gave an Opinion (SCCNFP 0743/03) on bergamottin, which concluded there was insufficient data on photo-toxic potential to come to an opinion*].

§ 4.4 We are also informed by Lecrenier that oxypeucedanin & oxy-bergamottin are also to be banned unless Cropwatch or other organization can provide data indicating safe use by April end (2007).

#### § 5. Cropwatch’s Reaction to Limiting FC’s in Cosmetics.

The SCCP seems to apply different objectivity criteria in executing its’ various Opinions, presumably for undisclosed political reasons. The SCCP (2001) Opinion on FC’s was widely dismissed, amongst other things, for failing to distinguish the different properties of linear FC’s (xanthotoxin, psoralen etc.) from angular FC’s (e.g. angelicin). The further SCCP Opinion 0942/05 is a substandard & disappointing rag-bag of previous assumptions & presumptions,

not universally endorsed by all workers in this area. (e.g. bergapten is 'probably carcinogenic' (IARC 1987), an assumption not based on any robust evidence). One of the main features of the 0942/05 document is a listing of FC occurrence in some (mainly citrus) products, but the data is not comprehensive over the total range of FC-containing (citrus) ingredients available to perfumers i.e. does not cover the various mechanically prepared single expressed oils (pellatrice, sfumatrice, scorzella, machine process or whatever), the various concentrated (deterpenated) oils, terpeneless oils, sesquiterpeneless oils, solvent extracted oils, distilled oils etc. etc. Most importantly the Opinion is embarrassingly short of any actual proof whatsoever of *in vivo* human FC photo-carcinogenicity. Further, its conclusions are at variance with those of other workers Chouroulinkov *et al.* (1989), Dubertret *et al.* (1990), EMEA (1990) etc. as pointed out previously by Cropwatch. No single case study of photo-carcinogenicity from the application of FC containing oils e.g. expressed bergamot oil, has yet been identified (as many observers have pointed out in mails to Cropwatch). This SCCP Opinion therefore is rejected by Cropwatch as being not of a standard of evidence sufficient to support the restriction of FC's to 1ppm in cosmetics.

Bear in mind also that a watershed for the precautionary principle approach has been reached over a previous SCCP Opinion on Tea Tree Oil (SCCP Opinion 08438/04) which predicted tea tree oil was not safe in cosmetics – now proven completely incorrect by an extensive analysis of end-user data. Having proven that this predictive methodology doesn't work, Ian White (Chairman of the SCCP, and in Cropwatch's opinion, well overdue for replacement) has to halt these flawed SCCP Opinions right now, and a better, more reliable evaluation system for the toxicological assessment of fragrance ingredients has to be devised.

It is quite clear, too, that our supporters believe these measures are totally 'over the top'. Bergamot oil for example has an almost ubiquitous use in fragrances (see below) so where are all the predicted adverse fragrance end user reactions? We haven't actually got a citrus oil derived photo-chemical cancer epidemic on our hands - quite the opposite - we have a near zero reporting of adverse reactions from modern citrus/FC-containing perfumes. Others supporters point out that a simple measure such as a labeling requirement would have sufficed instead of an unworkable 1ppm limit – after all it works for thousands of clients receive aromatherapy body massages annually, where up to 2.5% of citrus oils in carrier oils are used. Clients are merely instructed to strictly avoid actinic light for the next 12-24 hours. There seems, therefore, no need to further undermine the natural aromatics sector in such a heavy-handed manner by banning crucial ingredients.

In conclusion, and although this may sound a little melodramatic, it is hard not to put these unsound regulatory decisions on furanocoumarins & their effects on the fragrance trade in the very strongest of condemnatory terms. On balance, we

have to consider these decisions as to tantamount to regulatory philistinism, and we cannot dismiss them as anything less than a crime against the perfumery art.

## **§ 6. Cropwatch's Position & Further Action on FC's.**

You will remember that Cropwatch had previously established (see <http://www.cropwatch.org/newslet3.htm>) that many, if not most, perfumers are unaware of the FC contents of their ingredients, and they are not helped by the ingredient (citrus oil) producers, who often do not know either. We also established that leading perfume chemists even argued about whether FC's were steam distillable.

**§ 6.1** Cropwatch had previously pointed out to the Cosmetics Head of Unit in Brussels that removal of FC's in citrus oils was not affordable technology for many small essential oil producers, and Cropwatch received the following concrete assurance on this matter from Sabine Lecrenier (written on 11<sup>th</sup> Dec 2007 for the EU Cosmetics Commission):

"... Lastly regarding furocoumarins, no decision has been taken at this stage regarding the implementation of the SCCP opinion 0942/05. My services are still considering the matter taking into account your remarks and we will keep you informed regarding developments. **Furthermore, if a restrictive measure would be envisaged, a public consultation, via our website, on economic impact would need to be carried out. that because of this threat of financial discrimination, the measure to limit FC's would not go through.**"

We are unaware, or perhaps may have missed the notification of any public consultation on this issue (?), but the sequence of events since Lecrenier's mail had not particularly convinced us that this assurance on the grounds of financial discrimination was going to hold up. Furthermore, there is no mention of this public consultation eventuality in Lecrenier's letter to Cropwatch of 4<sup>th</sup> April 2007.

**§ 6.2 Further Action.** Cropwatch has recently written to a number of leading citrus oil producers and end-users and will be meeting with a number of these over the coming weeks. It appears that the reported EFFA position (that manufacturers will be able to produce FC free oils to the required limits) is an option only open to the economically privileged producers, and can be safely dismissed as not being a universally applicable solution. Cropwatch will be supporting those producers who cannot afford the technology to produce FC-free oils to the standard demanded, and has written to the FAO and the WHO to ask if financial assistance for citrus producers will be available for those producers who are potentially economically discriminated against by this particular EU policy. We will be looking to see what further action is possible against these unfair prospects.

## **§ 7. The Importance of Citrus Ingredients to Perfumery: Spelling It Out.**

Frerot & Decorzant (2004) of Firmenich somehow predicted in advance that the EU would limit FC's to 1ppm (*how did they know this was going to happen? – we were sold a different story*), and presented a published paper quantifying FC's in citrus products using sophisticated analytical technology that many small citrus producers are unable to afford - HPLC coupled with UV, fluorescence, and mass detection. Sure enough, the SCCP Opinion 0942/05 then conveniently cites the Frerot & Decorzant (2004) paper as the way to assess FC's in essential oils. Cropwatch, with its' watchdog's hat on, is extremely worried that this is yet another example of an emerging discriminatory technical divide between the corporate dinosaurs and small producers, and the situation might involve collusion between big business and EU lawyers to suit their individual positions. This eventuality, of course, would be working against the interests of free competition & trading within the EU.

Meanwhile here are some brief notes & indications on how absolutely vital citrus ingredients are to perfumery (N.B. this is not an exhaustive FC containing ingredients list – see <http://www.cropwatch.org/newslet3.htm> for a more comprehensive account).

**§ 7.1 Bergamot Oil.** *According to the SCCNFP 07403/05, 'bergamot oil' – type & origin not specified - contains 2.2% bergamottin, but is also notorious` for its bergapten content (0.3% within a total FC content of 3.0%: ref Forlott, unpublished data). Bergamot oil also contains bergaptol.*

Suppose for a moment that bergamot oil might be effectively banned as a perfumery ingredient, as currently seems more than possible. Bergamot oil has both a citrus & herbaceous character and mixes seamlessly with the palette of citrus oils and many herbaceous notes especially lavender & basil, making it particularly useful in masculine fragrances. It is also useful in fresh top note accords in floral fragrances. It also mixes well with mossy and ambery notes, and because it has this herbal dimension to its character, it is the cornerstone of the eau de cologne & chypre perfumes. Its place in perfumery is unique. Its employment in male fragrances is virtually ubiquitous and represents a lot of the fresh fragrance character - examples CK One (Calvin Klein 1994), Cool Water (Davidoff 1988), Eau Savage (Dior 1966), and in female fragrances it is also virtually ubiquitous as part of top note accords e.g. Chanel 19 (Chanel 1970), Anais-anais (Cacharel 1979), Rive-Gauche (Y. Saint-Laurent 1971), Obsession (Calvin Klein 1985). Bergamot oil is also of course used to flavour Earl Gray tea – but no doubt suitable reasons will appear to prevent this flavoured beverage from being banned. However, in perfumery, bergamot oil is not capable of being replaced.

**§ 7.2 Bitter Orange oils.** *Contain 'large amounts' of oxypeucedanin (Naganuma et al. 1985). The main application for bitter orange oil is in eau de colognes where it imparts a sharp freshness to the citrus cologne character, and generally in citrus accords, for the same sort of effect on the top-notes of fragrances.*

**§ 7.3 Lemon oils.** *Cold-pressed lemon oils vary widely in their FC content. Naganuma et al. (1985) principally found bergapten (range 4 to 87 ppm) & oxypeucedanin (range 26 to 728ppm) to be responsible for the photo-toxicity, indicating that the phototoxic potential of oxypeucedanin being a quarter of that of bergapten.* Whereas bergamot oil has a middle & top note presence, lemon oil is a wonderful fresh top-note material used widely in men's fragrances e.g. Paco (Paco Robanne 1996), Kenzo pour Homme (Kenzo 1991), often in combination with other citrus oils (such as bergamot, lime & mandarin). Lemon oil is also used in women's fragrances; it is widely used for its supremely fresh natural character in personal care & toiletry products, particularly in foam baths, shower gels & shampoos.

**§ 7.4 Lime oils.** *According to the SCCNFP 'cold pressed lime oil' – type & origin not specified - contains 2.5% bergamottin. However Naganuma et al. (1985) indicate oxypeucedanin as the principle FC. Minor FC's such as oxypeucedaninyl acetals in Key Lime type A or oxypeucedanin methanolate are still in the process of being characterised in processed oils (Feger et al. 2006).* Lime oil expressed can be used in perfumery to add notes to eau de cologne, straight citrus blends for foam baths etc., washing up liquid perfumes, men's fragrances, although washing up liquid and foam fragrances can often be constructed with distilled lime oil. For example Tommy (T. Hilfinger 1995) contains bergamot, lemon, lime, mandarin & grapefruit, and Eau de Patou (J. Patou) contains lemon & lime as well as bergamot & mandarin in its fresh citrus complex. Lime oil blends well with other citrus oils particularly bergamot and lemon, also with lavender and aromatic herbal notes such as armoise and as such is used frequently in men's fragrances. Lime is usually used in its cheaper forms (lime terpenes, lime oil washed q.v.) in toiletries and household fragrances. Lime oil is not often used now in soap & detergent perfumery because of its' poor stability and has been superceded by fragrance chemicals with lime odour profiles such as dihydromyrcenol (Burfield 2007).

**§ 7.5 Grapefruit oils.** *Cold pressed white grapefruit oils contain up to 1.5% FC's (mainly) including bergamottin. Some varieties of 'Sweetie' grapefruit oils also contain FC's.* White grapefruit oils have a number of small applications in perfumery, including uses in male fine fragrances for citrus theme top notes and generally minor application in citrus cocktail perfumes, although since it has been ten to fifteen times more expensive than orange oil in recent years, these uses have been restricted. The cheaper 'Sweetie' Grapefruit oils have been used by some perfumers as a substitute for white grapefruit oils, but annual production volumes are limited (Burfield 2007).

**§ 7.5 Mandarin oils.** *Cold-pressed mandarin oil contains 250 ppm bergapten: IFRA.* Mandarin oils are used in perfumery for top notes in fine female - fragrances, and in large amounts in male fragrances to produce fresh notes, particularly in combination with woody accords e.g., Dune for Men (Dior 1998), Freedom for Men (Hilfinger 1999). Terpeneless mandarin oil was especially prized

in perfumery for its aldehydic notes, but nowadays is an extremely expensive perfumery material (and probably virtually unusable because of the new restrictions on methyl-N-methyl anthranilate). In flavours it has considerable usage, especially in liqueurs, chocolate and baked products. Italian mandarin oils are made from fruits of varying ripeness giving rise to 3 basic oils: green, yellow, and red, but Argentinean mandarin oil is only made from ripe fruit, and so is reddish-orange (Burfield 2007).

**§ 7.6 Tangerine oils.** *Cold-pressed tangerine oil contains 50ppm bergaptene (IFRA).* Perfumery uses are as for mandarin oil – in any case, many unscrupulous traders pass one off as the other to non-discerning customers.

**§ 7.7 Angelica oils.** *Academic studies of lab prepared root oils of *Angelica archangelica* L. ssp. *archangelica* var. *sativa* (Miller) Rikli reveal the presence of the angular furanocoumarins angelicin & archangelicin, as well as lesser amounts of linear furanocoumarins. Solvent extracts (often passed off as essential oils) contain angelicin, bergaptene, imperatorin, oxypeucedanin hydrate, xanthotoxin and xanthotoxol. However, overall evidence for (any) FC content in commercial angelica root oil qualities from various species & origins is conflicting (see <http://www.cropwatch.org/newslet3.htm>). Angelica qualities (root or seed oils of various geographic origins & species, solvent or CO<sub>2</sub> extracts, absolutes etc.) are not widely used in perfumery, and their power is such that when they are employed, they are generally present at relatively low levels e.g. 0.1%, rarely more. However angelica oil has been used to good effect in chypres to enhance spicy peppery accords; and it also finds some uses in masculine fougères. Angelica oil blends well with many aromatic raw materials woody including patchouli, vetivert and clary sage, and many workers consider that this property is, in part, due to synergistic effects imparted by the macrocyclic lactones (Burfield 2007).*

## **§ 8. IFRA's Position on FC's.**

Reading between the lines, IFRA do not seem to appear to know quite what to do about FC containing perfumery ingredients, and they have warned their members in Information Letter IL 772, that several (presumably, largely citrus) materials may eventually disappear from cosmetics / perfumery usage. Many of us aromaphiles have little sympathy for IFRA's position, especially after the Prance Internet article which seemingly revealed IFRA's true colours, confirming IFRA's support for synthetics over naturals, an article which was subsequently rather hastily withdrawn (for references see *Cropwatch Newsletter* March 2007). After being tarred with an anti-naturals reputation, IFRA now appear anxious not to be seen as responsible for this current demise, and appears to be engaging in a blame-shifting exercise – by suggesting a 'pow-wow' between (citrus) producers and end-users as a way of deciding a strategy for the FC situation. But many of you will remember that it was the IFRA organisation that got us into this situation in the first place, by introducing a Standard imposing a 15ppm limit on FC's in

finished perfumes on 1<sup>st</sup> Dec 1996 (which few cosmetic/fragrance companies seem to either been aware of, or have subsequently adhered to).

### § 9. 'The Campaign for Real Perfume' is launched.

In a world where the perfume industry is now run by regulatory affairs managers and lawyers, feeding off the results of dermatologists & toxicologists, and the trade media dances to the tunes of the regulators, how can the perfume consumers demand non-synthetic perfumes and avoid all the disappointing regulatory-conformist remakes of established conventional perfumes (for example Guerlain's reformulation of Mitsouko, first minus the nitro-musks and now, more devastatingly, minus the oakmoss).

We have to remember that some of us have been here before. In the UK, the world's most popular beverage (beer) was under threat from the big brewers set to maximize profits by producing a bland processed product designed to keep for weeks in a pubs & clubs setting, stored in metal kegs, and dispensed under pressure with carbon dioxide. The 'Campaign for Real Ale' was launched in the 1970's and proved successful in convincing the public that real traditional cask-conditioned ale, kept in cool cellars, and dispensed by beer-engines mechanically hand-pumped by publicans was the superior form of beer.

It is not an inconceivable step to imagine that this same rationale could be applied to perfumes, as a result of consumer back-lash, so that 'perfume' should be composed of wholly natural ingredients (natural perfumes), or a mixture of naturals and synthetics (conventional perfumes). Natural ingredients should not be discriminated against by legislators who are over-represented & over-influenced by career toxicologists, dermatologists and regulatory affairs managers, nor should we have a situation where legislators have the continuity of their own careers uppermost in their minds when rubber-stamping precautionary principle-based health & safety legislation which has neither been tested nor statistically proven at the user-end.

These steps would enable us to get back to producing & marketing crafted **real perfumes**. Please help by contacting Cropwatch at [info@cropwatch.org](mailto:info@cropwatch.org)

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