Oils

CIR EXPERT PANEL MEETING

DECEMBER 13-14, 2010

ADMINISTRATIVE

Cosmetic Ingredient Review

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Memorandum

To: CIR Expert Panel Members and Liaisons

From: Christina L. Burnett and Monice Fiume, Scientific Writer/Analysts

Date: November 3, 2010

Subject: Draft Report of the Plant-Derived Edible Oil Group

At the August 2010 meeting, the CIR Expert Panel reviewed reports on edible vegetable oils and nut oils and determined that there were no major differences in the overall toxicity potential of these two oil groups. These reports were merged into one report to be named Plant-Derived Edible Oils.

While the Panel agreed that the edible oils for which fatty acid profiles were available (i.e., most of the ingredients) could be determined to be safe in the present practice of use and concentration, there was concern over ingredients for which fatty acid profile data were not available. Accordingly, the Panel issued an Insufficient Data Announcement. Additional data needs included chemical composition, specifically fatty acid profiles, of the oils for which those data were not given in the report are needed. These oils included:

Actinidia Chinensis (Kiwi) Seed Oil
Aleurites Moluccanus Bakoly Seed Oil
Arctium Lappa Seed Oil [Burdock]
Avena Sativa (Oat) Kernel Oil
Bassia Butyracea Seed Butter
Bassia Latifolia Seed Butter [Mahwa]
Brassica Napus Seed Oil [Rapeseed]
Brassica Olearcea Acephala Seed Oil [Kale]
Brassica Oleracea Italica (Broccoli) Seed Oil
Camellia Japonica Seed Oil
Camellia Kissi Seed Oil [Tea]
Camellia Sinensis Seed Oil
Canarium Indicum Seed Oil [Galip]
Caryocar Brasiliense Fruit Oil [Pequi]
Citrus Paradisi (Grapefruit) Seed Oil
Citrus Limon (Lemon) Seed Oil
Coix Lacryma-Jobi (Job's Tears) Seed Oil
Corylus Americana (Hazel) Seed Oil
Crambe Abyssinica Seed Oil [Abyssinian Mustard]
Elaeis Oleifera Kernel Oil [Palm]
Fragaria Chiloensis (Strawberry) Seed Oil
Fragaria Vesca (Strawberry) Seed Oil
Fragaria Virginiana (Strawberry) Seed Oil
Gevuina Avellana Oil [Chilean Hazel]
Hippophae Rhamnoides Oil [Sea-Buckthorn]
Hippophae Rhamnoides Fruit Oil [Sea-Buckthorn]
Irvingia Gabonensis Kernel Butter [Dika]
Luffa Cylindrica Seed Oil [Luffa]
Lupinus Albus Seed Oil [White Lupine]
Lycium Barbarum Seed Oil [Goji Berry]
Morinda Citrifolia Seed Oil [Noni]
Olea Europaea (Olive) Husk Oil
Passiflora Edulis Seed Oil [Passion Fruit]
Plukenetia Volubilis Seed Oil [Sacha Inchi]
Pyrus Malus (Apple) Seed Oil
Ribes Rubrum (Currant) Seed Oil
Rosa Canina Fruit Oil [Dog Rose]
Rubus Chamaemorus Seed Oil [Cloudberry]
Schinziophyton Tartanenii Kernel Oil [Mongongo]
Silybum Marianum Seed Oil [Thistle]
Solanum Lycopersicum (Tomato) Seed Oil
Solanum Lycopersicum (Tomato) Fruit Oil
Torreya Nucifera Seed Oil [Kaya]
Vaccinium Myrtillus Seed Oil [Bilberry]
Vaccinium Vitis-Idaea Seed Oil [Ligonberry]
Vegetable (Olus) Oil (CAS No. 68956-68-3)

Additional data on chemical properties and fatty acid compositions, as well as HRIPT studies, on numerous oils have been either discovered in the published literature or received from the Personal Care Products Council and are incorporated in this draft report in Tables 3, 4, and 7, respectively. Approximately half of the ingredients for which there were fatty acid composition data needs have been addressed, with discovery that some of the ingredients are synonyms for other ingredients for which we have data. Due again to the voluminous amount of unpublished data, data will be accessible online. Paper copies will be mailed out only by request. Materials were discovered/received after the data cut-off deadline and will be provided to the Panel in Wave 2 supplemental distribution.

CIR staff received a few comments regarding incorporating the structure of the impurity, glycidol, into the report. However, no mention was made about incorporating the structure of aflatoxin. Is there value in adding these structures into the report? If there is, they will be added in the next stage of the report, which would be reviewed by the Panel in March.

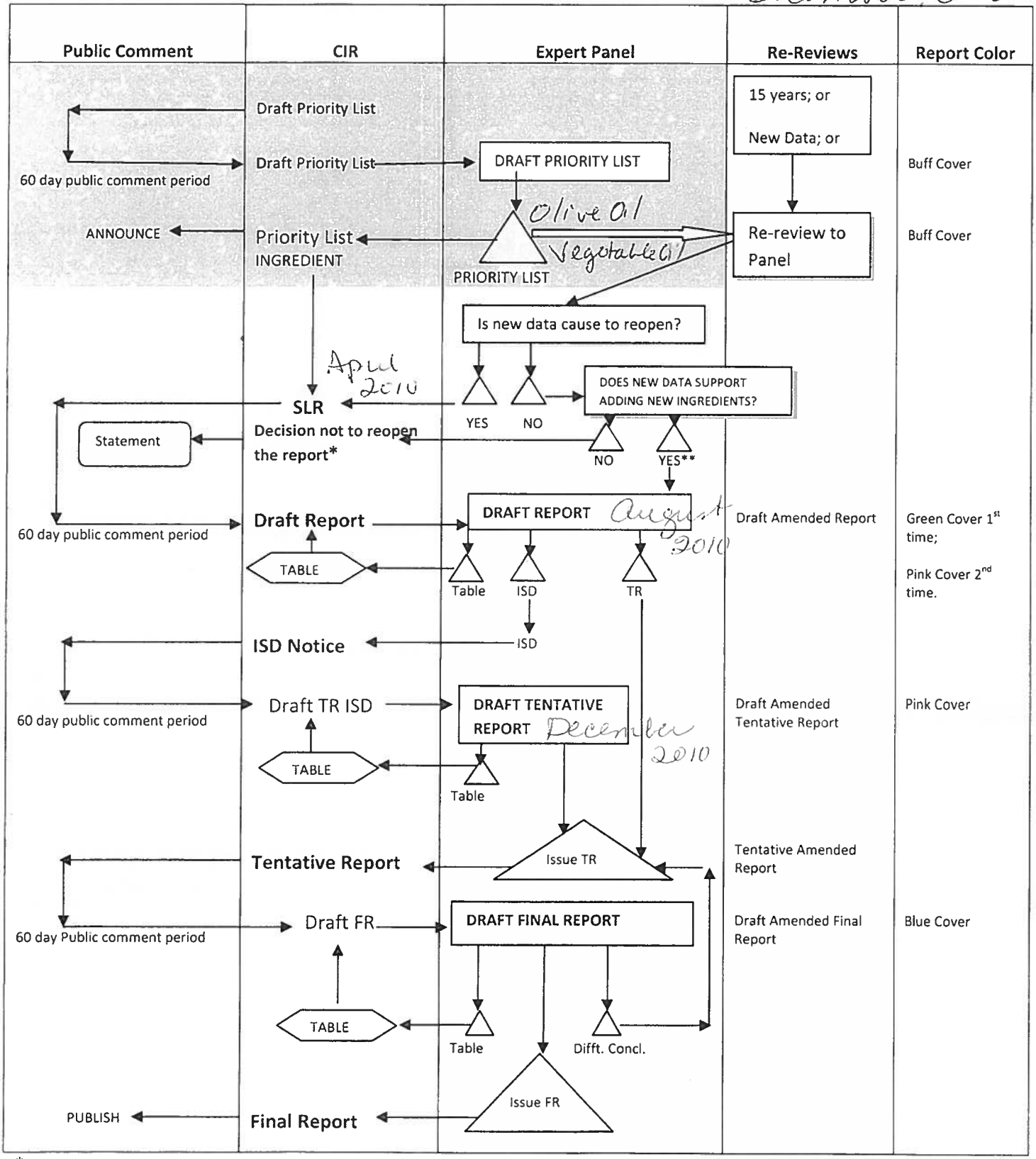
If the data provided are now sufficient for the Panel to assess the safety of these ingredients, a tentative conclusion should be developed regarding their safety in cosmetics, along with a rationale for that conclusion. The report will then be issued as a Tentative Safety Assessment.

For your convenience, the materials for this report can also be found at http://www.cir-safety.org/dec10.shtml.

SAFETY ASSESSMENT FLOW CHART

Oils

December 2011



*The CIR Staff notifies of the public of the decision not to re-open the report and prepares a draft statement for review by the Panel. After Panel review, the statement is issued to the Public.

**If Draft Amended Report (DAR) is available, the Panel may choose to review; if not, CIR staff prepares DAR for Panel Review.

△ Expert Panel Decision

▭ Document for Panel Review

⇨ Option for Re-review

CIR Expert Panel History with Plant-Derived Edible Oils

April 2010 and June 2010 - CIR issued Scientific Literature Reviews for Vegetable Oils and Nut Oils, respectively.

August 2010 - The CIR Expert Panel reviewed reports on edible vegetable oils and nut oils and determined that there were nomajor differences in the overall toxicity potential of these two oil groups. These reports were merged into one report to be named Plant-Derived Edible Oils.

While the Panel agreed that the edible oils for which fatty acid profiles were available (i.e., most of the ingredients) could be determined to be safe in the present practice of use and concentration, there was concern over ingredients for which fatty acid profile data were not available. Accordingly, the Panel issued an Insufficient Data Announcement. Additional data needs included chemical composition, specifically fatty acid profiles, of the oils for which those data were not given in the report are needed. These oils included:

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Citrus Limon (Lemon) Seed Oil
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Lupinus Albus Seed Oil [White Lupine]
Lycium Barbarum Seed Oil [Goji Berry]
Morinda Citrifolia Seed Oil [Noni]
Olea Europaea (Olive) Husk Oil
Passiflora Edulis Seed Oil [Passion Fruit]
Plukenetia Volubilis Seed Oil [Sacha Inchi]
Pyrus Malus (Apple) Seed Oil
Ribes Rubrum (Currant) Seed Oil
Rosa Canina Fruit Oil [Dog Rose]
Rubus Chamaemorus Seed Oil [Cloudberry]
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Vegetable (Olus) Oil (CAS No. 68956-68-3)

Literature Search on Plant-Derived Edible Oils

Ingredients	Toxline PubMed	ChemIDplus	HSDB	CAplus	NTIS	HPV	Merck USP
	√	√	√	√	√	√	√

Additional searches were performed on USDA's GRIN and AGRICOLA databases and via general search engines.

Ingredients were searched by Latin botanical (INCI) names, common names, and CAS numbers, when available. The list of ingredients searched is found in Table 1 of the vegetable oil report.

Literature searches included chemical composition, fatty acid composition, dermal toxicity, irritation, and sensitization qualifiers.

Searches were performed between November 20, 2009 and March 30, 2010; June 30 through July 8, 2010; and updated September 1 through October 15, 2010.

Oils Data Profile* – Dec 2010 – Writers, Christina Burnett and Monice Fiume							
	Previously Reviewed	Reported Use	Chemical Properties	Fatty Acid Composition	Irritation/ Sensitization- Animal	Irritation/ Sensitization- Clinical	Ocular Irritation
Actinidia Chinensis (Kiwi) Seed Oil		X	X	X			X
Adansonia Digitata Oil		X	X	X			
Adansonia Digitata Seed Oil						X	
Hydrogenated Adansonia Digitata Seed Oil							
Aleurities Moluccana Seed Oil		X	X	X		X	X
Hydrogenated Kukui Nut Oil							
Aleurites Moluccanus Bakoly Seed Oil							
Amaranthus Hypochondriacus Seed Oil				X			
Anacardium Occidentale (Cashew) Seed Oil		X	X	X			
Arachis Hypogaea (Peanut) Oil	X	X	X	X	X	X	
Hydrogenated Peanut Oil	X	X					
Potassium Peanutate							
Sodium Peanutate							
Peanut Acid	X						
Arctium Lappa Seed Oil							
Argania Spinosa Kernel Oil		X	X	X		X	
Hydrogenated Argania Spinosa Kernel Oil							
Astrocaryum Murumuru Seed Butter		X	X	X		X	
Sodium Astrocaryum Murumuruate		X					
Avena Sativa (Oat) Kernel Oil		X	X	X		X	
Bassia Butyracea Seed Butter				X			
Bassia Latifolia Seed Butter		X		X			
Bertholletia Excelsa Seed Oil		X	X	X			
Borago Officinalis Seed Oil		X	X	X		X	
Brassica Campestris (Rapeseed) Seed Oil		X	X	X		X	
Brassica Campestris (Rapeseed) Oil Unsaponifiables							
Hydrogenated Rapeseed Oil		X	X	X			
Rapeseed Acid							
Potassium Rapeseedate							
Sodium Rapeseedate							
Brassica Napus Seed Oil				X			
Brassica Oleracea Acephala Seed Oil		X					
Brassica Oleracea Italica (Broccoli) Seed Oil			X	X		X	
Butyrospermum Parkii (Shea) Oil		X	X	X			
Butyrospermum Parkii (Shea) Butter		X	X	X	X	X	X
Butyrospermum Parkii (Shea) Butter Unsaponifiables		X					
Hydrogenated Shea Butter		X					
Camelina Sativa Seed Oil		X		X		X	
Hydrogenated Camelina Sativa Seed Oil							
Camellia Japonica Seed Oil		X		X			
Camellia Kissi Seed Oil		X		X			
Camellia Oleifera Seed Oil		X	X	X			
Hydrogenated Camellia Oleifera Seed Oil		X					
Camellia Sinensis Seed Oil		X		X		X	
Canarium Indicum Seed Oil							
Canola Oil		X	X	X		X	
Canola Oil Unsaponifiables		X					
Hydrogenated Canola Oil		X					
Carica Papaya Seed Oil		X	X	X			
Carthamus Tinctorius (Safflower) Seed Oil	X	X	X	X	X	X	
Hydrogenated Safflower Seed Oil							
Potassium Safflowerate							
Sodium Safflowerate							
Safflower Acid							
Carya Illinoensis (Pecan) Seed Oil			X	X			
Caryocar Brasiliense Fruit Oil		X	X	X		X	
Chenopodium Quinoa Seed Oil		X		X		X	
Citrullus Lanatus (Watermelon) Seed Oil		X	X	X		X	
Citrus Aurantifolia (Lime) Seed Oil			X	X			
Citrus Aurantifolia (Lime) Seed Oil Unsaponifiables							
Hydrogenated Lime Seed Oil							
Hydrogenated Lime Seed Oil Unsaponifiables							
Citrus Aurantium Dulcis (Orange) Seed Oil			X	X			
Citrus Aurantium Dulcis (Orange) Seed Oil Unsaponifiables							
Hydrogenated Orange Seed Oil							

Oils Data Profile* – Dec 2010 – Writers, Christina Burnett and Monice Fiume							
	Previously Reviewed	Reported Use	Chemical Properties	Fatty Acid Composition	Irritation/ Sensitization- Animal	Irritation/ Sensitization- Clinical	Ocular Irritation
Hydrogenated Orange Seed Oil Unsaponifiables							
Citrus Grandis (Grapefruit) Seed Oil		X		X			
Citrus Grandis (Grapefruit) Seed Oil Unsaponifiables							
Hydrogenated Grapefruit Seed Oil							
Hydrogenated Grapefruit Seed Oil Unsaponifiables							
Citrus Paradisi (Grapefruit) Seed Oil		X	X				
Citrus Limon (Lemon) Seed Oil				X			
Cocos Nucifera (Coconut) Oil	X	X	X	X	X	X	X
Hydrogenated Coconut Oil	X	X				X	X
Cocos Nucifera (Coconut) Seed Butter							
Magnesium Cocoate	X	X					
Potassium Cocoate	X	X				X	
Potassium Hydrogenated Cocoate	X						
Sodium Cocoate	X	X					
Sodium Hydrogenated Cocoate	X						
Coconut Acid	X	X					X
Hydrogenated Coconut Acid	X	X					
Coix Lacryma-Jobi (Job's Tears) Seed Oil							
Corylus Americana (Hazel) Seed Oil	X	X		X			
Hydrogenated Hazelnut Oil							
Corylus Avellana (Hazel) Seed Oil	X	X	X	X	X	X	
Crambe Abyssinica Seed Oil		X		X		X	
Cucumis Sativus (Cucumber) Seed Oil		X		X			
Cucurbita Pepo (Pumpkin) Seed Oil		X	X	X			
Hydrogenated Pumpkin Seed Oil							
Cynara Cardunculus Seed Oil				X			
Elaeis Guineensis (Palm) Oil	X	X	X	X	X	X	X
Elaeis Guineensis (Palm) Kernel Oil	X	X	X	X			
Hydrogenated Palm Kernel Oil	X	X					
Elaeis (Palm) Oil							
Hydrogenated Palm Oil	X	X					
Elaeis Guineensis (Palm) Butter							
Palm Kernel Acid		X					
Potassium Palm Kernelate		X					
Potassium Palmate		X					
Potassium Hydrogenated Palmate							
Sodium Palm Kernelate		X					
Sodium Palmate		X					
Sodium Hydrogenated Palmate							
Palm Acid		X					
Hydrogenated Palm Acid							
Elaeis Oleifera Kernel Oil		X		X			
Euterpe Oleracea Fruit Oil		X		X		X	
Fragaria Ananassa (Strawberry) Seed Oil			X	X			
Fragaria Chiloensis (Strawberry) Seed Oil							
Fragaria Vesca (Strawberry) Seed Oil							
Fragaria Virginiana (Strawberry) Seed Oil							
Garcinia Indica Seed Butter		X	X	X			
Gevuina Avellana Oil		X		X			
Genuina Avellana Seed Oil							
Glycine Soja (Soybean) Oil		X	X	X			
Glycine Soja (Soybean) Oil Unsaponifiables		X				X	
Hydrogenated Soybean Oil		X				X	
Soy Acid							
Potassium Soyate							
Sodium Soyate							
Gossypium Herbaceum (Cotton) Seed Oil	X	X	X	X	X	X	
Hydrogenated Cottonseed Oil	X	X				X	
Cottonseed Acid	X						
Guizotia Abyssinica Seed Oil			X	X			
Helianthus Annuus (Sunflower) Seed Oil		X	X	X		X	
Helianthus Annuus (Sunflower) Seed Oil Unsaponifiables		X				X	
Hydrogenated Sunflower Seed Oil		X					
Sunflower Seed Acid							
Hippophae Rhamnoides Oil		X			X		

Oils Data Profile* – Dec 2010 – Writers, Christina Burnett and Monice Fiume							
	Previously Reviewed	Reported Use	Chemical Properties	Fatty Acid Composition	Irritation/ Sensitization- Animal	Irritation/ Sensitization- Clinical	Ocular Irritation
Hippophae Rhamnoides Fruit Oil		X		X			
Hippophae Rhamnoides Seed Oil			X	X			
Irvingia Gabonensis Kernel Butter		X				X	
Juglans Regia (Walnut) Seed Oil		X	X	X			
Limnanthes Alba (Meadowfoam) Seed Oil		X		X		X	
Hydrogenated Meadowfoam Seed Oil							
Linum Usitatissimum (Linseed) Seed Oil		X	X	X		X	X
Linseed Acid		X					
Luffa Cylindrica Seed Oil		X					
Lupinus Albus Seed Oil		X					
Lupinus Albus Oil Unsaponifiables							
Lycium Barbarum Seed Oil		X					
Macadamia Integrifolia Seed Oil		X	X	X			
Hydrogenated Macadamia Seed Oil							
Macadamia Ternifolia Seed Oil		X	X			X	
Sodium Macadamiaseedate							
Mangifera Indica (Mango) Seed Oil		X	X	X		X	
Mangifera Indica (Mango) Seed Butter		X				X	
Sodium Mangoseedate		X					
Morinda Citrifolia Seed Oil							
Moringa Oleifera Seed Oil		X	X	X		X	
Moringa Pterygosperma Seed Oil		X				X	
Oenothera Biennis (Evening Primrose) Oil		X	X	X		X	
Hydrogenated Evening Primrose Oil		X					
Olea Europea (Olive) Fruit Oil .		X	X	X	X	X	X
Olea Europaea (Olive) Oil Unsaponifiables		X				X	
Hydrogenated Olive Oil		X				X	
Hydrogenated Olive Oil Unsaponifiables		X				X	
Potassium Olivate		X					
Sodium Olivate		X				X	
Olea Europaea (Olive) Husk Oil			X	X			
Olive Acid							
Orbignya Cohune Seed Oil		X		X			
Orbignya Oleifera Seed Oil		X	X	X		X	
Potassium Babassuate							
Sodium Babassuate		X					
Babassu Acid							
Orbignya Speciosa Kernel Oil		X					
Oryza Sativa (Rice) Bran Oil	X	X	X	X	X	X	X
Hydrogenated Rice Bran Oil							
Oryza Sativa (Rice) Germ Oil	X	X		X	X		X
Oryza Sativa (Rice) Seed Oil							
Rice Bran Acid	X						
Passiflora Edulis Seed Oil		X	X	X			
Hydrogenated Passiflora Edulis Seed Oil							
Perilla Ocymoides Seed Oil		X		X			
Persea Gratissima (Avocado) Oil	X		X	X		X	
Persea Gratissima (Avocado) Oil Unsaponifiables		X					
Hydrogenated Avocado Oil		X					
Persea Gratissima (Avocado) Butter	X	X					
Sodium Avocadoate		X					
Pistacia Vera Seed Oil		X	X	X			
Hydrogenated Pistachio Seed Oil							
Plukenetia Volubilis Seed Oil		X				X	
Prunus Amygdalus Dulcis (Sweet Almond) Oil	X	X	X	X	X	X	X
Prunus Amygdalus Dulcis (Sweet Almond) Oil Unsaponifiables							
Hydrogenated Sweet Almond Oil		X					
Hydrogenated Sweet Almond Oil Unsaponifiables							
Sodium Sweet Almondate		X					
Prunus Armeniaca (Apricot) Kernel Oil		X	X	X		X	
Prunus Armeniaca (Apricot) Kernel Oil Unsaponifiables							
Hydrogenated Apricot Kernel Oil		X					
Hydrogenated Apricot Kernel Oil Unsaponifiables							
Prunus Avium (Sweet Cherry) Seed Oil		X	X	X			
Prunus Domestica Seed Oil		X	X	X		X	

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Prunus Persica (Peach) Kernel Oil		X	X	X		X	
Hydrogenated Peach Kernel Oil							
Punica Granatum Seed Oil		X	X	X			
Hydrogenated Punica Granatum Seed Oil							
Pyrus Malus (Apple) Seed Oil		X	X	X			
Ribes Nigrum (Black Currant) Seed Oil		X	X	X		X	X
Hydrogenated Black Currant Seed Oil							
Ribes Rubrum (Currant) Seed Oil							
Rosa Canina Fruit Oil		X				X	
Hydrogenated Rosa Canina Fruit Oil							
Rubus Chamaemorus Seed Oil		X					
Rubus Idaeus (Raspberry) Seed Oil		X	X	X		X	
Hydrogenated Raspberry Seed Oil							
Schinziophyton Rautanenii Kernel Oil		X					
Sclerocarya Birrea Seed Oil		X	X	X			
Sesamum Indicum (Sesame) Seed Oil	X	X		X	X	X	X
Sesamum Indicum (Sesame) Oil Unsaponifiables	X	X					
Hydrogenated Sesame Seed Oil	X						
Sesamum Indicum (Sesame) Seed Butter							
Sodium Sesameseedate	X						
Silybum Marianum Seed Oil [Thistle]		X		X			
Solanum Lycopersicum (Tomato) Fruit Oil		X					
Solanum Lycopersicum (Tomato) Seed Oil		X	X	X		X	
Theobroma Cacao (Cocoa) Seed Butter		X	X	X		X	
Sodium Cocoa Butterate							
Theobroma Grandiflorum Seed Butter		X		X		X	
Sodium Theobroma Grandiflorum Seedate							
Torreya Nucifera Seed Oil							
Triticum Vulgare (Wheat) Germ Oil	X	X		X	X	X	X
Triticum Aestivum (Wheat) Germ Oil							
Triticum Vulgare (Wheat) Germ Oil Unsaponifiables		X					
Hydrogenated Wheat Germ Oil Unsaponifiables							
Hydrogenated Wheat Germ Oil							
Wheat Germ Acid		X					
Vaccinium Corymbosum (Blueberry) Seed Oil			X	X			
Vaccinium Macrocarpon (Cranberry) Seed Oil		X	X	X		X	
Hydrogenated Cranberry Seed Oil							
Vaccinium Myrtillus Seed Oil		X					
Vaccinium Vitis-Idaea Seed Oil		X					
Vegetable (Olus) Oil		X				X	
Hydrogenated Vegetable Oil		X					
Vitis Vinifera (Grape) Seed Oil		X	X	X		X	
Hydrogenated Grapeseed Oil		X				X	
Sodium Grapeseedate		X					
Zea Mays (Corn) Oil	X	X	X	X	X		X
Zea Mays (Corn) Oil Unsaponifiables	X	X					
Zea Mays (Corn) Germ Oil	X	X				X	
Potassium Cornate	X						
Corn Acid	X						

Alternate shading indicates a related set of ingredients; i.e. Arachis Hypogaea (Peanut) Oil and related peanut-derived ingredients have been shaded blue.

*"X" indicates that data were available in a category for the ingredient

TRANSCRIPTS/MINUTES

116th COSMETIC INGREDIENT REVIEW EXPERT PANEL

MEETING

BREAKOUT SESSION

Washington, D.C.

Monday, August 30, 2010

PARTICIPANTS:

Voting Members:

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Vanderbilt University School of Medicine

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School of Veterinary Medicine
Department of Veterinary Patholobiology
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Liaison Members:

JAY ANSELL, Ph.D.
Personal Care Products Council

ROBERT BRONAUGH
Food and Drug Administration

DON BJERKE
Procter & Gamble

SAMUEL COHEN
University of Nebraska

ROBERT FINKING
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PARTICIPANTS (CONT'D):

TRACY GUERRERO
Silicones Environment, Health and Safety Council of North America

Staff Members:

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Director

LILLIAN C. BECKER
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WILBUR JOHNSON, JR.
Senior Scientific Analyst

BART HELDRETH, Ph.D.
Chemist

Other Attendees:

JULIE SKARE
Procter & Gamble

* * * * *

we certainly don't want to start getting into PC areas or non- cosmetic from a regulatory standpoint.

DR. BELSITO: Okie doke. Anything else on the isoparaffins? So we're ready to go back to vegetable oil at this point? Okay.

So this is Green 2 followed by Green 3. And I guess before we start I just want to point out that at least for one of the vegetable oils, mainly rice germ oil, there's a content of arachidonic acid. And as Wilbur and Monice know, but I don't think anyone else was on the panel when we looked at that, the conclusion for arachidonic acid was insufficient because of questions about dermal carcinogenicity. So we're going to have going forward, you know, with these -- the issue being out there that if they contain arachidonic acid, like rice germ oil is said to contain 5 percent. And then there's an ingredient that we previously found not to be -- not to have adequate data.

And then in the nut oil report, I'll

just jump to that, if you scan the tables there, arachidonic acid isn't even listed as one of the fatty acids that could be in nut oils. And I don't know if that's just an oversight or it's just not there.

Having said that, except for the arachidonic acid issue I thought that these could be safe as used and basically go from there. But we also had the chance to see comments from the Personal Care Product Council on these and I guess that is nice, but it raises, I guess, the issue why they're getting a preview before the panel is getting a look.

MS. BURNETT: That was for the SLR. The comments were for the SLR. We have new comments on the document that we received last week. We've been including comments that we had for the previous drafts into these packets. So they saw -- you guys do not see the scientific literature review, but it goes out for public comment and that's what we received.

DR. SNYDER: So during the -- so the

generation of the SLR during the public comment period is when the scientific advisory you think is -- that's when they're making their comments -- initial comments?

MS. BURNETT: Yes.

DR. SNYDER: And then they make subsequent comments after each draft of the document?

MS. BURNETT: Mm-hmm.

DR. BELSITO: So I guess I was never aware of this since it's never happened before. So the scientific -- so the first time we look at the book it's beyond the scientific literature review point?

MS. BURNETT: It's a draft.

DR. SNYDER: That's if you look at the flowchart.

DR. BELSITO: Right. Okay. But the scientific literature review has been made available to interested public members?

MS. BURNETT: Mm-hmm.

DR. BELSITO: Or just interested members

of the Personal Care Product Council?

MS. BURNETT: No. It's made public.

DR. BELSITO: And how is it made public?

MS. BURNETT: Announcement goes out. The industry submits their interested parties. We have it on the website. And then that way anyone who has data can submit it.

DR. BELSITO: Okay.

MS. BURNETT: And by the time you see it usually data has been submitted.

DR. BELSITO: Okay. So I was never aware of it. I thought the first time we were seeing it was the scientific literature review.

MS. BURNETT: It's called a draft when you see it.

DR. BELSITO: Yeah. So it's a step after. Okay. So then that's fair.

MS. BURNETT: And we try to address whatever comments we can. There were a few repeat comments because we didn't know necessarily how to handle them and then we do want your input on some of them, so.

DR. BELSITO: So I guess the biggest issue I have, and again this is where a read across would be helpful, is do we have all of the information for the ingredients of all the many vegetable oils we're including here? And I know the answer to that is no.

MS. BURNETT: No. And we have data. You saw the second wave. Monice and I are still working on summarizing it.

DR. BELSITO: Yeah. I saw that's all the second wave. But I think the issue is going to be unless we go back and look at arachidonic acid and find that it's safe as used or go back at the Noone and DeFavo data and try and do some kind of risk assessment on concentration based upon those vegetable oils, like rice germ oil that contain arachidonic acid, then any vegetable oil where we don't have full ingredient listing or full knowledge of the composition where the chain lengths are going to be lower than arachidonic acid or any that will be insufficient, as will any that contain arachidonic acid, the ones that we

don't know are insufficient for composition and the ones that do are insufficient because arachidonic acid is insufficient. Because otherwise it seems irrational that the panel found arachidonic acid to not have sufficient data yet we're approving vegetable oils that contain it.

The others in my estimation are safe as used. And then, of course, we have the heavy metal boilerplate, the aflatoxin, the pesticide. We have those issues that go into the discussion. Those were the only comments I had.

Curt, Paul, Dan?

DR. LIEBLER: I --

DR. SNYDER: I didn't have anything additional.

DR. LIEBLER: I was not on the panel when arachidonic acid was reviewed, but I've studied, you know, fatty acids and liquid oxidation on mechanisms and toxicity related to their oxidation products for a long time and I know that -- I'm not surprised that arachidonic acid would have issues, particularly in relatively high concentrations because it has such high liability than to go autoxidation to a variety of products that would have toxic properties.

I would imagine -- I remember reading through this I was interested in -- I was just looking for the table on the fatty acid compositions which I don't have in front of me at the moment, but I was struck by the fact that most of the oils we're talking about here don't have high polyunsaturated fatty acid concentrations. They're relatively low. You would sorry about linoleic acid, arachidonic acid, docosahexaenoic acid, anything with a lot of double bonds based by one carbon each. And those are relatively infrequently found. And I think this problem would be relatively self-limiting because oils that are high in those products would tend to go bad quickly and have undesirable properties because the oxidation products have a lot of awful smells.

And so I didn't notice any of the oils, at least I know that you had a list. Did you, Christina, in here, a table? And I'm just not finding it here.

DR. SNYDER: Well, we did receive a whole bunch of data on the composition.

DR. BELSITO: Yeah. For vegetable oils.

DR. LIEBLER: And the nut oils.

DR. BELSITO: Yeah. We're in vegetable oils right now.

DR. LIEBLER: Okay.

DR. BELSITO: Yeah.

DR. LIEBLER: Oh, yeah. Table 3. Sorry. Table is a lengthy table, but had most of these. So most of these oils are actually restricted to, like linoleic acid is a polyunsaturated fatty acid with two double bonds. So I didn't see this as likely to be much of an issue. Rapeseed oil.

(Discussion off the record)

DR. LIEBLER: But I think almost all the oils, maybe all the oils we're looking at here did not contain significant amounts of any fatty acid with more than two double bonds. And those oils -- those fatty acids would be pretty stable to most conditions of storage or use. So there are a couple of oils. It's hard to read this table -- this version of the table. Sometimes the computer fails me. Yeah, most of these don't contain polyunsaturated with more than two double bonds, if at most a percent or so, and that's probably not going to be cause for concern.

I didn't have any comment beyond that. I just wanted to point that out.

DR. BELSITO: So other than arachidonic acid, are there any fatty acids looking at their molecular structure that would concern you?

DR. LIEBLER: Well, the ones that would have a high liability to oxidation to obnoxious, you know, potentially dangerous products would be arachidonic, docosahexaenoic, which is 22:6, linolenic, which is 18:3 and that's kind of borderline. And those are the only ones listed on the table here that would have much of a liability. Things that have two double bonds, like linoleic, which is a major constituent of

many of these, or docosadienoic, which is 22:2 or eicosadienoic, which is 22 double bonds, those are very slowly oxidizing in comparison to arachidonic and docosahexaenoic.

SPEAKER: Which are the three again?

DR. LIEBLER: So the three that have the greatest liability of oxidation are arachidonic, docosahexaenoic. So arachidonic is 20:4. Docosahexaenoic is 22:6. And I would throw linolenic in there. It's borderline. That's 18:3. But all the fatty acids with no double bonds or one double bond are going to be essentially resistant to oxidation under any normal conditions.

DR. BELSITO: Okay.

DR. LIEBLER: Again, I think this might be a somewhat self-limiting problem because the oils that would have high fatty acid -- high polyunsaturated fatty acid content generally aren't plant oils in the first place. And they would have sort of been weeded out of product use because they would have had undesirable qualities. They would have smelled bad from the beginning because it's very hard to --

DR. KLAASSEN: Rancid.

DR. LIEBLER: Yeah. Rancidity. That's what rancidity is, exactly, all those aldehyde fragments of the oxidized fatty acids.

DR. BELSITO: Yeah, so let me just read you the discussion from arachidonic acid. Dermal absorption data are lacking in this report and we thought that the data -- that data was necessary for a determination of safety. Based upon the results of dermal absorption we felt there may be additional data needs. Referred to the studies about UV light-induced cutaneous immunosuppression and immunomodulatory data might be requested. Also, dermal carcinogenicity, photocarcinogenicity, human irritation, sensitization, and photosensitization.

So basically we went insufficient for dermal absorption and then if absorbed, immunomodulatory data, carcinogenicity and photocarcinogenicity, and human irritation, sensitization, and photosensitization. Anyway, interestingly, Monice wrote this report. It was quite a contentious meeting. What year was that? Not because Monice wrote it, but --

MS. FIUME: I think it was published in '93.

DR. BELSITO: October '93.

DR. LIEBLER: There's been a lot of arachidonic acid biology falling under the bridge since then so maybe one of the other things with arachidonic particularly is it's a fatty acid precursor to numerous bioactive prostaglandins and other eicosanoids, some of which have been very clearly shown since then to be key drivers of skin carcinogenesis. So there would be a lot of reasons to have concern.

DR. BELSITO: Well, you said there's been a lot of data in the past 17 years --

DR. LIEBLER: Since the early '90s, yeah.

DR. BELSITO: Okay. So then the question is whether, I mean, because again I don't feel that we can logically rule on the safety of these if we don't have all the compositions. Or if we have the composition and it contains arachidonic acid, unless we first reopen the arachidonic acid report and decide whether the data that's occurred in the past 17 years is sufficient to support the safety of that, then it becomes a non-issue to this report.

So I guess I would say safe as used assuming we have all the components and there's no arachidonic acid. Rice germ oil is insufficient because it's reported to contain arachidonic acid. And or the other alternative would be to table this and reopen the arachidonic acid report.

DR. SNYDER: I have a question. So how come our insufficient reports don't arise to the top of our priority list periodically? Or do we have any? Because that --

DR. BELSITO: It's surprising because if it was reported in '93, that's more than 15 years.

DR. SNYDER: Correct. So why isn't -- why isn't it a CIR report safety assessment?

DR. BELSITO: Why hasn't it come up for review?

DR. SNYDER: It went insufficient that long ago, not (unintelligible).

DR. BRESLAWEC: I think the assumption is that if there were data available, that industry would have provided them and we would have considered the new data and reopened the report based on the new data. But as a routine we do not look at --

DR. BELSITO: Well, there were two ingredients when I came on that were highly contentious. This was one. The other was urocanic acid for many of the same issues. So I suspect perhaps the reason it hasn't come back up is it sounds like form Dan that there is a lot of new data, but industry probably just stopped using it in cosmetics because of the brouhaha that went around. But now we're confronted with the fact that there are things like vegetable oils that at least partially may be composed of this fatty acid.

DR. ANSELL: Well, I think John -- John will be reporting tomorrow that the industry, through the Scientific Scholar Committee, has taken this whole insufficient issue on. We conducted an extensive analysis of all of the insufficient and are proposing some changes to the CIR procedures which would clarify the whole situation. We agree that this hanging out in this vague netherworld of neither safe nor unsafe is inappropriate. We have some proposals that I'm sure John is going to talk about tomorrow.

DR. BELSITO: Okay. Well, so I guess we'll have this discussion tomorrow. I mean, other than for the arachidonic acid issue I have no issues with them. The report is rather extensive and complete.

DR. LIEBLER: Yeah. I agree with you, safe as used. And arachidonic acid should be a flag. You know, it just looks like -- just look at these fatty acid compositions. It seems like at least for the (unintelligible) that were selected here they -- nature tends to make C12 to C18 fatty acids with no more than two double bonds and usually just one or none. And that's the bulk of these oils.

I guess the only question that comes up is if you flag arachidonic acid, do we get ourselves into a situation where we have to have some minimum value and have some basis for coming up with a minimum content of arachidonic acid?

DR. BELSITO: Well, I mean, that's the issue. But we need to go back and look at arachidonic acid to do that.

DR. SNYDER: We don't have the data.

DR. BELSITO: Right. So we can't do it without reopening that report and tabling this pending a conclusion on arachidonic acid.

DR. LIEBLER: If you ever open arachidonic acid you'd have a lot of new data to go through I'm sure. So.

DR. SNYDER: It seems as though that only two paths forward are insufficient here because the arachidonic acid report was insufficient, or safe here, and then reopen the record on the acid.

DR. LIEBLER: You could say safe as used as long as they don't contain arachidonic acid and cite the previous report.

DR. BELSITO: But then how can we -- when you have -- again, rice germ oil is reported to have -- I believe, have 5 percent arachidonic acid. When you say arachidonic acid, the data are insufficient, we haven't even said for arachidonic acid he data are insufficient at a concentration above whatever --

DR. LIEBLER: It's just insufficient.

DR. BELSITO: Just insufficient.

DR. LIEBLER: Yeah, so you could simply say that except for oils that contain arachidonic acid data is insufficient. You can just throw that oil out.

DR. ANSELL: This is still very early in the report process. I think this is an important issue and perhaps we could take it back to the CSSC and get some advice as to how we might address the arachidonic acid. I'm just not aware

of what to do at this point. It's quite possible that the users are quite aware of it and control the concentration because of, you know, very practical issues.

DR. LIEBLER: Can I ask either Jay or Monice or somebody else here who might know, the data in Table 3, were they from sort of a variety of sources?

MS. BURNETT: Yes.

DR. LIEBLER: A variety of sources? So it wasn't like it'll be great if one lab just had all these samples and did them all on a common platform.

MS. BURNETT: No. Some came from --

DR. LIEBLER: And put lower limits on -- if something is listed as blank, does zero mean less than, you know, some amount? I guess if that's a hodgepodge of sources then it's going to be very difficult --

MS. BURNETT: For each -- I'm not sure I should say this. For each entry there's either one or two references.

DR. LIEBLER: I see.

MS. BURNETT: For each oil.

DR. ANSELL: But Carol, in her search, identified potential databases. Not on the tox side, but on the agriculture side.

MS. BURNETT: Right. Agriculture.

DR. ANSELL: And thinks that there's probably a lot more compositional data.

MS. BURNETT: We received some composition data from suppliers I think they were that I couldn't access, but a member could. So we were provided that data. Some of it came from books, textbooks, source books.

DR. SNYDER: So that goes to the table. So the blank spaces do mean zero.

MS. BURNETT: There's, yeah. Nothing entered, there's nothing there.

DR. LIEBLER: No reported venture (inaudible) means it's below the limited platform, right?

MS. BURNETT: I would find a published study that had done a chemical analysis maybe on

-- well, it's the other report, but hazelnut oil -- that gave very succinct, you know, 14.1, you know, percent. And it would be a whole plethora of, you know, the fatty acids. And then you'd go to a textbook and it would just give you a rounded range.

DR. LIEBLER: That's precise.

MS. BURNETT: So there will be variability within the table.

DR. LIEBLER: We don't need to beat it to death.

DR. BELSITO: Yeah. But just since we're on that table, you know, if it wasn't for the fact that I was a member of the panel or a new member as it was when we did arachidonic acid, I would have looked at the highlighting and assumed not only that we had reviewed it, but that we had reviewed it and it was safe as used. So I don't know how to do it in a black-and-white copy, but if there was some way in the future when we're putting these tables together where there are individual ingredients that we previously

reviewed, to do it in a different color or to do it -- I don't know how you do it. You know, italicize it and underline it.

DR. SNYDER: Put another column.

DR. BELSITO: And, you know, indicate that --

MS. BURNETT: We can separate it out.

DR. BELSITO: Right. That, you know, the data was insufficient. I just looked up myristic acid. That was safe as used.

DR. SNYDER: It was? Okay.

MS. FIUME: Table 2 gets you the conclusions.

DR. BELSITO: I understand. But, you know --

MS. FIUME: No, I know you mean for the table, but you said you looked up (unintelligible).

DR. BELSITO: Right.

MS. BURNETT: And we do have -- I mean, we have some color printing capabilities, but when it comes to producing the Panel Book we don't

always know if we're going to have color or not. So. And then when it goes to the Journal it's not going to have a color option.

DR. BELSITO: No, no, no. That's fine.

MS. BURNETT: Okay.

DR. BELSITO: Okay. I suppose you're right. Monice, Table 2.

MS. BURNETT: No, I mean, I know it doesn't crossover, but rather if you were --

DR. BELSITO: Right.

MS. BURNETT: -- interested rather than having to go through a compendium.

DR. BELSITO: Right. Okay. So we'll see what the other group wants to do and Jay will bring it back to the Scientific Committee and see what they want to do about arachidonic acid. Whether tomorrow we go ahead with an insufficient for those that contain it or those that we don't have all the ingredients. The rest are safe as used. Or whether we table it to await a decision as to whether to reopen arachidonic acid. And, I mean, we can do nut oils, but it's going to be the same issue with nut oils. Only with nut oils the aflatoxins come in with the vegetable oils, you know, so heavy metals, pesticides. Otherwise, safe as used as long as they don't have arachidonic acid, aflatoxins, heavy metals, and pesticides.

MS. BURNETT: Did you feel that the two reports could be combined into one data plan throughout?

DR. BELSITO: I don't care.

MS. BURNETT: You don't care?

DR. BELSITO: Do you know what I mean? It's a rather mega report so I guess to have two different reports -- I guess the only reason to do -- the strongest argument to do two reports are that with the nut oils we need to do the discussion about protein versus fatty acid. So from that regard I would want a separate report for nut oils.

MS. BURNETT: But there's already the same discussion in the vegetable oil.

DR. SNYDER: Yeah. We have the same for vegetable oil.

MS. BURNETT: Because there are vegetable oil and fruits that can cause --

DR. BELSITO: Avocado oil? Yeah. Okay. So, fine. I mean, what does the other group want to do? Make it one big mammoth --

MS. BURNETT: And one is only 30 ingredients; the other is 200-something, so.

DR. BELSITO: Oh, well, 230-something, might as well try and go for a record after we did -- what was our record before?

DR. ANSELL: 368.

DR. BELSITO: I mean, we have to do that in the discussion. You know, I'm fine with that if that's what they want to do. I think the longer discussion will occur as to what to do with arachidonic acid rather than combine the two reports.

Okay. Did anyone have anything to say on nut oil?

So, cocoamidopropyl betaine. Well, we got this wonderful presentation this morning.

116th COSMETIC INGREDIENT REVIEW EXPERT PANEL

MEETING

Washington, D.C.

Monday, August 30, 2010

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* * * * *

A F T E R N O O N S E S S I O N

(1:01 p.m.)

DR. MARKS: What time is it?

DR. BERGFELD: It's 1:01.

DR. MARKS: It's 1:01, so it's time to begin. Everybody get enough vegetable oil over lunch?

Okay, we're going to go to the next group of ingredients, the vegetable oils, which also include fruit oils, too, if I read this correctly as to the ingredients.

Is that correct, Christina?

MS. BURNETT: (off mic)

REPORTER: Microphone, please.

MS. BURNETT: Anything that can be expressed from something that you can eat, except for nuts, is in that report.

DR. MARKS: Okay. And then I guess one also -- the issue was raised -- we'll start with the vegetable and fruits, and then we'll move on to the second group of oils, the nut oils, in this Green Book, but one might consider combining all

the oils together.

Okay. So this is the first time we've seen -- I'm going to refer to it as the vegetable and fruit oils. And as always, the first question is, do we have all the data we need to consider these ingredients are safe for including in cosmetics or do we have data needs?

So, I'll ask my teammates, do they feel comfortable with the data we have in hand?

MS. BURNETT: As you are aware, you received a second wave, it was composed of 800 pages, not -- that data was not in the report. You have not seen it, and we have not -- we're still in the process of summarizing it, so --

DR. MARKS: Most of that, yeah. So, what Christina is clarifying is that we have over 800 pages of supplementary data that was sent to us electronically by a for now unnamed individual, and there was no summary of it either in this paper document nor preceding that. Most of that, as I recollect, was sensitization, irritation, but there were some other toxicologic papers mixed in.

So, thank you, Christina, for mentioning that. So, large -- not large -- huge group of oils. I didn't tally it up -- did you, Christina? -- what the number of oils in fruit and --

MS. BURNETT: I lost track --

DR. MARKS: -- vegetable.

MS. BURNETT: -- but it's around 200.

DR. MARKS: Two hundred. So, approximately 200 cosmetic ingredients.

DR. SLAGA: So, we could make one big -- so, yeah, just before the meeting we were talking, Ron and I, about the magnitude of this and that how many years people have been eating vegetable oils of all type and putting it on their skin for centuries and centuries. And it would be hard to believe that there would be some other potential contaminants in that type of thing that we really would have to worry about. And I'd start right in the beginning, recommend we should -- since the nut oils are very edible, too, and they're very similar, so combine it all together into one document.

DR. MARKS: The two Rons, do you want to just proceed and discuss this as all one document and include the nut oils, which are how many more ingredients? About 30, 40?

MS. BURNETT: (Shaking head)

DR. MARKS: Yeah, so what's another 30 or 40 when we're up to 200? Does that make sense from a, let me see, both an ingredient toxicologic point of view that we should put these all together?

DR. SHANK: Yes.

DR. MARKS: Is there any alerts that should separate out the nuts from the vegetables and the fruits?

David, don't laugh. Did you like the way I worded that?

MR. STEINBERG: Loved it.

DR. MARKS: Is there any scientific reason, let's -- that we should separate all these oils?

No. Okay, so I think the first business, then, is we think we should combine these two reports and proceed with considering them as one group: The edible oil group.

DR. SHANK: How about plant-derived oils?

DR. MARKS: Plant-derived oils. Sounds good.

DR. SHANK: Better than edible to me.

DR. SLAGA: (off mic)

DR. MARKS: Now, so I'm just going to start it off by saying when we look at the plant oil from hazelnuts, that if I'm correct, the panel in the past felt there was insufficient data and issued a report of insufficient data. And the needs were concentration of use, manufacture contaminants, irritants, and sensitization, UV absorption, a 28-day dermal tox, a reproductive and developmental tox, and genotox were all the eight needs for hazelnut seed oil.

I think probably many of those needs are present with this, or not, when we expand it to over to 200 oils? And if that's the case, how do we reconcile a previous report? Do we reopen it?

Is the seed -- I don't think the seed oil is different than the oils we're taking about here. That's on page 20 in the second report, but let me see what that -- so, if you look on page 20, that's Panel Book page 172, you'll see under hazel seed oil, insufficient data.

DR. ANDERSEN: Yeah, I think, Jim, that's one example of why we thought there was actually benefit to combining all of these together. There are bits and pieces to address those issues from other oils, and if we can do a read across from those, because while there are composition differences, those composition differences may not be toxicologically relevant, then we have a big picture that we can paint even though for hazelnut there are missing pieces.

So, that's what we were thinking would be the strategy for this, not that we have actually found data on hazelnut, but we may be able to use a read across approach to say that data on other vegetable oils are applicable across the board.

DR. MARKS: And Alan, then, would you leave hazelnut seed oil standalone or would you reopen that to include it in this? Because under Table 1, which is on the preceding page, 171, that's included under the nut oils under derivatives, so presumably everything in Table 1 would be included in this or else we'd have to carve out the oils that we previously had made a --

DR. ANDERSEN: I don't think there's any sense in carving it out. I think we bring it into this report and once we get to the end of this we would say that there is now an amended conclusion for hazelnut seed oil.

DR. MARKS: Okay. And the same, presumably if it's all safe, the same would be that we would just note that peanut oil was previously safe and it's included in this report as safe?

DR. ANDERSEN: Yeah.

DR. MARKS: Okay.

DR. ANDERSEN: Yeah, I think for the reader it's nice to have all of the same things in one place so that you know what the perspective was on this group of chemically similar ingredients being used in cosmetics.

DR. SHANK: In the new data submissions that were sent to us as electronic files, PDF files, one of the studies was done on the massage oil that was a mixture of several oils, including hazel seed oil, and it was not sensitizing, so we have data for hazelnut on sensitization.

DR. MARKS: So, we're going to combine these two as, I like that, plant oils. Data needs? Or we can just start with the manufacturing. These oils are squeezed out of their plant source. Is that enough for a method of manufacture?

DR. SHANK: Yes. Yes.

DR. MARKS: Because we aren't going to obviously have the method of manufacture for each one of them. I think it could be put in the report that these are manufactured along the same way. How about impurities? We can obviously cover some of the concerns with our boilerplates, like pesticides and heavy metals. I guess what I'm doing is going down the data needs. Maybe I should just say, Ron, Tom, and Ron, are there any striking data needs that we should have asked for from industry?

DR. SHANK: I had no data needs.

DR. SLAGA: I have none.

DR. MARKS: None.

DR. SLAGA: I do not either.

DR. HILL: I have two general questions. One is related to the bleaching. It says, the statement is made in here, "bleaching the neutralized oil with activated earth." The activated earth is not a bleach, is it? So, does that mean that there's a bleaching process carried out with, I don't know, hypochlorite or something? And then "activated earth" is used either simultaneously or subsequently to remove highly colored pigments?

Because I also had a similar question about what exactly the deodorization process

entails, and I realize that's all going to be proprietary, but can we get some generalities as to what's actually going on?

MS. BURNETT: I can probably get more information on that. I have this textbook that's this big and I only gave a purview from that, so I have as much more information as you'd like on those processes.

DR. HILL: Well, some generalities as to what's known about those processes.

MS. BURNETT: Okay.

DR. HILL: And then we have to talk about the glycidols issue, right?

DR. SHANK: Right.

DR. HILL: (off mic)

DR. MARKS: And then, Ron, what you were talking with the bleaching, is that a data need or just a clarification?

DR. HILL: It's a clarification, information need that ought to go in the report, I guess. Well, but, however, for me it's less a data need than an informational need.

DR. ANDERSEN: Well, it's a staff assignment to finish the homework.

DR. HILL: Yeah.

DR. MARKS: One of the -- and I'll ask the panel members how to reconcile this because I have difficulty, if I look at, for example, sunflower oil, there's certainly not an alert in the literature that this is a sensitizer. It's used up to 96 percent concentration, yet we have only an HRIPT of 2 percent confirming its safety. So I think this is going to cut across -- that's just the most extreme example, but it's going to cut across lots of these oils where, although I don't have an alert of sensitization from either my experience or the literature, I have difficulty reconciling our historic use of either local lymph node assays to predict which are sensitizers or HRIPT are maxed to confirm they aren't. So, I need some help in reconciling that before -- you know, I don't want to put an insufficient. You've got to come back with an HRIPT that says sunflower oil at 96 percent is safe, but, at the same time, I don't know quite how to deal with that.

Can you help me?

DR. SHANK: We have human sensitization on 40 percent sunflower seed.

DR. MARKS: Right.

DR. SHANK: Forty percent.

DR. MARKS: Okay.

DR. SHANK: It's as high as I can find.

DR. MARKS: That must be the supplemental. I was going back in the report.

Wilma?

DR. BERGFELD: I thought that within the document there was enough citation regarding when the protein from the plant was included in the oil that that's when the sensitization occurred. And if it was properly refined and the protein was not there, that these oils were not sensitizing. And they had cited several where the protein was the specific allergen.

DR. MARKS: I think that's relevant to Type I immediate type hypersensitivity reactions in which you're concerned, like, for example, peanuts, that an individual might be sensitive from a Type I reaction. But what I was referring to is a Type IV delayed type hypersensitivity reaction, and whether the protein is there or not is really, by and large, irrelevant.

I think, to me, one of the things that stuck out, again, with proper processing it wouldn't be an issue, but if you take cashews, as long as you take the nut of the cashew, you're fine. If it's contaminated with shell oil, the oil from the shell, then it can be a dramatic sensitizer.

So, presumably in the manufacturing of mango- derived -- or not mango, cashew -- mango's the same issue. You get rid of the -- if you get rid of the skin of the mango, you're not concerned. But if it weren't processed in the right way, manufactured, you could potentially contaminate the mango seed oil.

So, I am back to I don't know how to -- I'm not particularly concerned, but I don't have specific sensitization data, say, like sunflower.

DR. HILL: I didn't see any for sesame either. Did I just miss it?

DR. MARKS: Oh, I think there will be plenty in here you don't find a sensitization.

DR. EISENMANN: They recently reviewed sesame in 2009, so I think we might -- I don't know how much of the original data in that report is in here, details.

DR. ANDERSEN: So, I think, thinking strategically, Jim, what I would like to be able to do is to show that there are some data across the entire spectrum of use concentration and if we're missing any irritation sensitization data in the high 90 percent exposure category, then that could still pop up as a data need. But if we have another oil that's been tested at 100 percent, and many of them have been, and it's not irritating or sensitizing, then the opportunity for extrapolating those data exists. So, even though there would be a missing piece for safflower, we would be arguing that the oil is not going to be significantly different from those that were tested at 100 percent.

So, we would want to be painting that picture of which oil do we have what data for and at what level, so that at least for, as was discussed in the other team, but you guys sound like you're asking the same questions, that this becomes a table, not necessarily to go in the report, but one that you can look at, to see what data elements are available for which oil at what level. And if that picture looks like there's enough filled in, you can be comfortable. If there are gaps you're not comfortable with, you get to flag them.

DR. MARKS: Christina, you are the most familiar. Is what Alan saying correct, that we have some HRIPT with 100 percent, or at least sensitization data for 100 percent of an oil? Without me going back and looking at those -- I was just picking on her.

MS. BURNETT: Eighty-six percent.

DR. MARKS: Eighty-six. Well, that's close. That's fine.

MS. BURNETT: I think there's some that are, if not 100 percent, pretty high.

DR. MARKS: That sounds fine, and then just to be -- for full disclosure, Christina sent me an e-mail concerning the Chenopodium quinoa seed oil where that was found to be -- when you look at the HRIPT there was clearly irritant reactions. There was erythema produced by a sunscreen containing that. And again, I think that could pretty much be ignored because it was a combination product, not just the Chenopodium quinoa oil. I thought if there was alert we would then focus more on that, but using what you have presented, I think it's quite reasonable to cut across.

So, sounds like we -- let me see here. So, Dr. Belsito and I will both be presenting this, so unless Dr. Belsito moves to include the vegetable, fruit, and nut oils all as one report, I will move to make it one report and with a conclusion of safe.

Any further comments?

DR. BERGFELD: Are you going to put in your discussion some of these elements that have just been discussed especially the plant-derived, the crosstalk or read-across information and support of safety?

DR. MARKS: Sure.

DR. ANDERSEN: Also, the issues of preservatives, heavy metals, that we traditional include --

DR. MARKS: Pesticides.

DR. ANDERSEN: -- in -- I'm sorry, pesticides. You've seen one P, you've seen them all. Yes. And that would be, again, an admonition to the people who source this material to continue what we expect is a longstanding practice.

DR. HILL: And so what's the story with the glycidols?

DR. SHANK: That can be handled in the discussion. Glycidol fatty acids is a contaminant. They're precursors to carcinogens, but in the purification process they are not

present in these plant-derived oils. That can be handled in the discussion.

DR. ANDERSEN: But we would want to be, again, advising industry that care needs to be taken to ensure that they are eliminated as the oils are processed.

DR. BERGFELD: Was there any concern about the reclassification of the document from -- between the fatty acids to triglycerides?

DR. SHANK: (off mic)

DR. BERGFELD: Yeah. But there were some fatty acids in there, too, were there not?

DR. SHANK: Free fatty acids.

DR. BERGFELD: I think there were in all three, but associated.

DR. MARKS: My sense is they were predominantly a mixture of triglycerides, is that correct?

DR. HILL: Some of them have mono- and diglycerides, I think.

MS. BURNETT: I put in the citations for previously reviewed fatty acids so that you were aware --

DR. MARKS: Right.

MS. BURNETT: -- and you could base safety on what the previous conclusions were.

DR. ANDERSEN: But the generic title that you've come to of plant-derived oils says it all.

DR. MARKS: Correct.

DR. HILL: Does that make sure that we're not thinking about things like limonene when you just say oils? Dr. Bailey raised that specifically in his memo to make sure that -- and then I think those were removed before we ever saw it. But if we just say oils are we making sure that it's clear that we don't mean volatile oils?

MS. BURNETT: It's no volatile oils.

DR. SHANK: Triglycerides, not essential oils.

MS. BURNETT: No essential oils, all -- sorry, blanked.

DR. ANDERSEN: Yeah, I think, Ron, I'm comfortable with plant-derived oils in the title with a very early in the introduction explaining that some things are not included for good reason.

MS. BURNETT: And there are in the list hydrogenated oils and some salts, simple salts, if you're okay with those.

DR. ANDERSEN: I think for generic, short title, we're still okay with plant-derived oils. The reader will very quickly see that it includes some that are further processed in terms of hydrogenation.

DR. BERGFELD: Can I ask a question? In several of these documents there is a statement both in the text as well as in the summary that with -- in regards to the plant oil is dependent on the region its grown, individual cultivars -- I'm not sure what that is -- and plant genetics. And I have written in here "plant part," for instance, seed versus kernel versus shell versus stem versus -- what are cultivars?

DR. MARKS: Cultivars are actually different varieties of the same plant.

DR. BERGFELD: Okay. So the plant part --

DR. MARKS: Like mums have multiple -- they're -- if you take the lay term --

DR. BERGFELD: Species?

DR. MARKS: No, it's not exactly a -- it's all the same species, but there are different variations within that species. So if you look at a mum, for instance, I'll use the lay word, there are spider mums, there are pompom mums, there are daisy mums, and those would be all considered cultivars, if I understand the floral/botany portion of this. That's my understanding of a cultivar.

And I think the differences in essentially different parts of the oils, my -- I thought in here the oils were basically from the nuts or the seeds within these plants because we get back to -- if it's just any place, then you get into, do you take a whole mango and squeeze that down and get a fair amount of caranols and anacardic acid and such, which are highly sensitizing in humans. And the same with a mango,

if you included the shell -- not the mango, the cashew -- if you included the shell you would have the same issue. It's just the nut, not the shell.

DR. BERGFELD: Do you think that you need to state that? I mean, because here on page -- Panel Book 20, just in the summary portion, the sentence is, "The percentage of chemical constituents and nutritional content in individual oil types is dependent on the region where the oil plant is grown, individual cultivars, and plant genetics."

The chemical constituents is also whether it's a seed versus the shell, so that's why I said plant part. I'm not sure that's a correct term. But this appears in many places, not in this particular document, but in others.

DR. MARKS: Right.

DR. ANDERSEN: But, Wilma, I think you're right. If you added "plant part" to that sentence, it's still a true sentence.

DR. BERGFELD: Right.

DR. ANDERSEN: That contributes to variability and, yes, you want to constrain that variability in this report to the identified sources which are mostly seed, but not entirely. There is bran oil, there's -- I won't go through the whole list, but the admonition to not -- not to be, I guess for supplier -- I guess it's mostly targeted to supplier, in preparing these to not cross-contaminate with other parts of the plant.

DR. MARKS: Correct.

DR. ANDERSEN: Saying that there's a seed butter or a seed oil that's okay if you are not careful, you could screw up that expectation of safety.

DR. MARKS: Which I think could be handled in the discussion, also, like we mentioned earlier.

Any other comments? So, we are going to combine these two reports.

DR. ANDERSEN: Jim, can I interrupt?

DR. MARKS: Oh, sure.

DR. ANDERSEN: Do you have a good citation to an example of the shell contaminating an extract that we could include by way of example?

DR. MARKS: Sure.

DR. ANDERSEN: Thank you.

DR. MARKS: Remind me. I can send you an endemic of cashew shell oil dermatitis which occurred in Pennsylvania a couple decades ago because of contaminated cashew nuts by the shell oil with the chemical analysis of that material actually.

DR. ANDERSEN: Thank you.

DR. MARKS: It's in the Journal of American Academy of Dermatology, probably about 1983? I'll give you the pertinent information.

Okay, Christina, if you don't find that reference, let me know.

MS. BURNETT: I am aware that there are some, so I can probably find some on my own.

Editorial question for you. On Table 7 in the vegetable oils, it's not very long right now that you see, but because of the data that we have received it's growing. What would be the best way you would like that organized? Alphabetized? By concentration? Section off each different oil? I don't know how easy it is for you to read right now and it could get really cumbersome. It starts on Panel Book page --

DR. MARKS: Fifty-four?

MS. BURNETT: Fifty-four. Yes.

DR. MARKS: Right. Can you be creative like you did with the use and concentration?

MS. BURNETT: Right now it's loosely alphabetized, so if it is -- if a related oil -- like in Table 1, I have it alphabetized for the most part. And then with hydrogenated I have categories with the hydrogenated -- what the parent is before it's hydrogenated. And that's what I tried to do on this to kind of mimic it, but if it doesn't make sense that way I can do it here, an alphabetized list or however.

DR. HILL: Could that be handled with some sort of a cross index table, just simply -- and I don't know, maybe that would just make matters worse. But, I mean, you're right, finding

things is important and it will be worse when it's getting longer. And I struggled with that a number of times when I was trying to go back and forth.

MS. BURNETT: Cross index --

DR. HILL: Some means of -- I mean, it would just list all the ingredients and give a table line or something. I mean, I don't know, some quick way of finding things.

DR. BERGFELD: (off mic)

DR. HILL: Yeah, because, I mean, you're referencing things by species name in some cases and common name in other cases and it would be nice to be able to quickly find both. And I'm not talking about for the whole document, I'm just talking about in that table.

MS. BURNETT: For the purposes of the report I did not write up a description of each study.

DR. MARKS: Correct.

MS. BURNETT: The table stands alone and that's it.

DR. HILL: Well, just finding things in that, what you said, relatively lengthy table, I mean, maybe that's a nonissue, but it is when you combine them.

MS. BURNETT: We'll brainstorm something and try to figure something out.

DR. MARKS: Quite frankly, I kind of like Table 7 because you can scan this pretty quickly in terms of concentrations and you can get the results and then you give a reference if you want more detail. So, I --

MS. BURNETT: I do see 100 percent oil on here, the babao.

DR. MARKS: Yeah, I noticed that, too, now that I immediately go to the table, so that takes care of that issue, Alan. But I think it would be difficult, probably, to condense this even though it might take -- you know, it's going to take more pages because we have more studies, but at least here it is and you have lots of sensitization.

DR. ANDERSEN: Well, what about the other direction, which is signposts? I'm looking at page 46 and I've got four entries for olive -- six, seven -- it's seven or so entries in the olive category. If there was a subheading that said, okay, here's the olive stuff --

DR. MARKS: Right, I think that's appropriate.

DR. ANDERSEN: Some of it's the oil, fruit oil, some of it's hydrogenated, but within that group it's -- you can look and see what your options are.

DR. MARKS: I think --

DR. ANDERSEN: And the olive gave you that signpost.

DR. MARKS: Right. I think that's perfectly acceptable to try and reduce and just give the ranges in that.

DR. ANDERSEN: Okay, we'll see what we can do.

DR. MARKS: Any other comments before we complete this discussion?

So, again, I'll reiterate, tomorrow I'm going to move that we combine both of these oils into one report, the plant oils, and that our conclusion will be safe as used for cosmetic ingredients.

DR. BERGFELD: And that's inferring that you've already commented on the protein and the soy and the nut?

DR. MARKS: Oh, yeah. That's all in the discussion. Absolutely. Yeah, it's going to be a very robust discussion.

DR. HILL: When we're back on the table, to give an example of what I meant when I said cross-referencing, in some cases, like raspberry, that's not too far different in the alphabet from -- I might slaughter the Latin -- Rubus idaeus, right? But on something like cranberry seed, Vaccinium macrocarpon, is quite a bit different to be looking at "c" in one case versus "v" in the other. So if you had something like cranberry, see the Latin name, or the other way around, if you go with olive and raspberry.

DR. MARKS: I would suggest we use the

INCI name and alphabetize it like that and just put in parentheses the lay name.

DR. HILL: But I was just -- if the table gets a lot longer I was just thinking in terms of having some way to do a look up so that you -- because otherwise you end up scanning the whole doggone table to try to find something, which even during the review is cumbersome. And I like the table, I agree.

DR. ANDERSEN: It's a challenge on how to work those signposts, there's no question about it. The reality is that the Latin name, while it's a good way of standardizing all of this stuff, they do not trip off the tongue lightly. And if we're doing a signpost, maybe cranberry is the better signpost under which you find the Latin name, et cetera, et cetera.

So, we'll take a look at it and see what seems to make sense because the average consumer looking at this isn't going to be thinking from Linnaean descriptions. It's going to be, oh, I'm supposed to stay away from cranberry.

DR. MARKS: I don't know, I would ask John and Carol's input. Because to me it's -- if you look at it from a world point of view, the only commonality is going to be the INCI name, which is the botanical name, not the lay name. So for us, even between Boston and perhaps someplace else, there might be different common names for the same cosmetic ingredient.

At any rate, we'll let you figure that out and we'll see it in the next edition with a tentative report with a conclusion of safe.

Next we're on to the 2011 Priority List and that's in the Buff Book 1, Panel Book page 16, et cetera.

Any comments about that? And my understanding is we're going to include a hair dye ingredient also in this.

DR. BRESLAWEC: If I could just point out that the only difference -- there are some differences between the list as you saw it in June and this list, and the changes reflect your comments and comments that we've received from

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type in there, Alan, or intended use?

DR. ANDERSEN: No. I think that will be clear from the discussion that it's -- you have lots of options on how to modify either the concentration of the ingredient, the level of impurities, or product type.

DR. BERGFELD: So, it's my understanding on page -- CIR Panel Book, page 76, under Quantitative Risk Assessment, that will be greatly expanded with the examples as indicated or suggested by Dr. Belsito? Okay.

Any other discussion? I'm going to call for the vote, then.

All those for the approval of the first version with amendment indicate by raising your hand. Thank you, unanimous.

Wow, that was a good one. Let's move on, then, to the next one, which is the plant oils. Dr. Belsito presenting.

DR. BELSITO: Yes. This is the first time that we're seeing this report, which is probably the largest report we've ever had to

review. And we received a whole lot of unpublished data, et cetera, et cetera.

In looking at this in general, my team felt that we could go safe as used with the usual plant boilerplates, with the exception that there is one component -- at least, of rice germ oil -- and that's arachidonic acid that we previously reviewed and found to be insufficient. Also, Dr. Liebler had some concerns not only about arachidonic acid, but dodeca-hexanoic acid and linolenic acid as having more than two double bonds that could be relatively unstable.

So, what we need would be to actually take a look at all of the vegetable oils in this report and for those in which we don't have composition, those would be insufficient awaiting composition. Those that contained arachidonic dodeca-hexanoic or linolenic acid would be insufficient for data on that.

Alternatively, if we wouldn't want to take that approach, my team suggested tabling this and reopening the arachidonic acid report, since it's been 16 years since we last looked at it and there's been 16 years' worth of data on it. And see, perhaps, we could find the cosmetic uses if there are any -- I don't know, John, that was one of the insufficients when you reviewed it. Is it still being used?

DR. BAILEY: Yes.

DR. BELSITO: So, maybe we want to table it and go back to arachidonic acid and reopen that and see what we're looking at.

DR. BAILEY: I mean, it's still being used, but the use frequency is quite low. So, it's not a real widely used material.

I think it would be very difficult to find someone to support the providing the safety data for it. But that's just sort of my best guess at this point.

DR. BELSITO: But there may be data out in the public literature since we looked at it in '93 that would support our data needs.

DR. BAILEY: There's a huge amount of data, yes.

DR. BERGFELD: Do you wish to discuss this? Marks' team?

DR. MARKS: Oh, yes. We had similar feelings that we would move toward safe. I think how handling at this point we felt we could actually move forward with a tentative report of safe, but we hear the insufficient data needs.

One of the discussion instances we felt that we would take this whole Green Book and combine the vegetable -- there's actually fruit oils in here along with nut oils -- and just make it one large document with over 200+ ingredients and call it Plant Oils. So we would suggest combining these two.

And then I think going forward, as you suggested, Don, with an insufficient clarifying -- it's interesting. If we do arachidonic acid, then that will come up in a priority list, obviously, on the re-reviews.

DR. BELSITO: But if --

DR. BERGFELD: I'm unclear what you want to do here.

DR. BELSITO: Well, I mean, I think that we were unclear as to where the panel would want to go, because if -- and I guess partly we're curious why arachidonic acid hasn't come up since it was last reviewed in '93 and the data were found to be insufficient. But I think in some ways if we look at this and we call these ingredients insufficient -- those that contain arachidonic acid -- and arachidonic acid comes up and we find that the available data in the literature then supports the safety of arachidonic acid as used in cosmetics, then we would have to go back and reopen this document to change our conclusion about all of the plant oils that contain arachidonic acid.

So, personally, I would be in favor of tabling this, reopening the arachidonic acid report, seeing where that goes, and then coming back to this report knowing that the biggest issue was those plant oils that contain, potentially, arachidonic acid.

DR. BERGFELD: Alan?

DR. ANDERSEN: Monice has some information. But the answer to the question of why hasn't arachidonic acid come up -- the panel made the policy decision early on for re-reviews that we were not going to initiate a re-review of an ingredient for which the data were insufficient. That was industry's problem. If they wanted to come forward with the data, knock your socks off. But we weren't going to do their job for them.

MS. FIUME: I just wanted to add, I did check the FDA frequency of use. It is only 14 uses. And then I just did a very quick search on Tox Net using arachidonic acid and dermal carcinogen; there's no new data for dermal carcinogenicity, which I believe was one of the reasons it went insufficient.

DR. SHANK: The arachidonic acid isn't in these oils as a free acid, it's part of a triglyceride. So why pick out arachidonic acid? Or are you concerned about peanut oil? I don't understand why you need to table this to find out about arachidonic acid as a free fatty acid, because these are triglycerides.

DR. LIEBLER: Arachidonic acid -- I'm -- I guess I'm not sure whether I should be surprised that there aren't any more dermal carcinogenicity data on arachidonic acid since the mid-'90s. But there's a tremendous amount of research that's been done on arachidonic acid and eicosanoid metabolites of arachidonic acid in modulating skin carcinogenesis. I mean, this has been a huge area of research, as Tom is quite aware. There's a lot of data. I'm not sure exactly where it comes down.

Admittedly, most of the arachidonic acid physiologically that's released is coming from phospholipids, released by phospholipases. These are on triglycerides. It's possible they could be released by lipases also in the skin, but I'm not sure about, you know, how efficient that process would be.

If I -- I just eyeballed the charts on the arachidonic composition of the oils in both of the reports, and it looks like the only one that has any reported arachidonic is the rice oil. And, you know, that's the only -- that's actually sort of an outlier among all of the oils in having a longer chain polyunsaturated fatty acid, because for the most part these are at most diunsaturated -- mostly monounsaturated, mostly shorter chain length, which I think removes most of the concerns I would have.

I pointed out yesterday in our discussion that part of the problem of lipid oxidation products is going to be somewhat self-limiting in that the oils that have a higher propensity to undergo oxidation are going to probably be unacceptable for use in these products anyway because of, you know, generating undesirable smells and things like that. So, I think the -- one possible approach to this could be to just consider everything but the rice oil. And with the concern there being the relatively high arachidonic content relative to all the other plant and nut oils that are being considered --

DR. BAILEY: I thought rice oil had already been reviewed and is, you know, safe based on an earlier review. So, you know, I'm just not sure that those dots connect, so.

DR. BERGFELD: Dr. Hill?

DR. HILL: Yeah, I was just going to point out that -- but I agree with only arachidonic acid. But if your concern is three or four bond unsaturated acids, then cherry kernel oil has a high percentage of eleostearic acid, borage oil has a high percent -- a relatively high percentage of -- oh, it's pretty small of gamma-linolenic. Black currant seed oil has a reasonable percentage of gamma-linolenic and stearidonic. Evening primrose oil has a pretty high concentration of gamma-linolenic and cranberry seed oil has a high concentration of 18-3 ethyl- linolenic, so.

DR. LIEBLER: Right, those points are well taken. I also noticed that.

I think the additional concern with arachidonic is that there's specific receptors for

many of the arachidonic metabolites that potentially amplify its biological effects.

Now, if rice oil has already been reviewed and is safe as used, it's something I didn't catch. And that may preempt this whole discussion.

DR. MARKS: John, I'm looking on page 172 of the Panel Book. And, you know, that's nut oil, so that wouldn't be rice, I'm sorry. I guess I need to do the -- I was --

DR. BELSITO: (Off mic)

DR. MARKS: Been approved, yes. That's page --

MS. BURNETT: Panel Book, page 27.

DR. MARKS: Twenty-seven, so it had been approved before.

MS. BURNETT: In 2006.

DR. BAILEY: These are edible oils, you know. Vegetable oils. So, I mean, they've been around a long time, we have a lot of experience with them. And, I mean, I think these are valid points. Maybe they should be addressed in the

part of the discussion and, you know, if there's concern about arachidonic acid specifically, that could be captured also in a part of a discussion. I'm just not sure it's really -- these are points to hold up the process.

DR. BELSITO: Well it's certainly -- for rice germ oil, a small percentage of the total composition. I guess the issue would then become what about the oils for which we do not have composition. If you're concerned about arachidonic acid, I mean, I don't know. I mean, it's potentially that specific oil might have a very high percentage of arachidonic acid and the absence of knowing the composition, I think we'd have to go insufficient on that basis.

DR. SLAGA: But keep in mind, it's (off mic) about there's no free acids in this that would have to be released. And the odds of that happening in the stratum corneum area are essentially zilch.

DR. BERGFELD: Dr. Hill?

DR. HILL: I was just going to say that

the fact that they're edible has nothing to do with it in this case, because the question is what happens in the skin. Because the processing of lipids in the gut is totally different than what happens in the skin.

Well, totally, that's not quite accurate. But quite different.

DR. BELSITO: Dan, do you want to comment?

DR. LIEBLER: Well, the only -- I think that I would want to see more data. I suppose -- well, I guess I would want to see more data on the arachidonic for plant oils, for which there wasn't a safe as used, and a high arachidonic content. I think that probably -- unless there are plant oils that we're considering, we don't have composition data for that -- that concern kind of goes away.

I would point out that actually, fatty acids don't need to be released from phospholipids or triglycerides to be toxic. In terms of oxidation products -- my colleagues Jason Morrow and Jack Roberts of Vanderbilt have done a lot of

work over the years demonstrating the formation of isoprostanes by non- enzymatic oxidation processes that result in products with significant activities, even when they're still connected to phospholipids and triglycerides.

But I think based on the data we have on the charts in front of us, the only component I would have had any concern about would have been the rice germ oil, and that's safe as used already. So, I think -- I feel like Emily Litella, right? "Never mind."

DR. MARKS: Right. Actually, there are a number of oils that have been felt to be safe with the exception of hazel seed oil, that's the only one when you look at this entire group. And that was an insufficient data.

DR. BRESLAWEC: But that was hazel seed oil. Wasn't that addressed subsequently?

REPORTER: Microphone, please.

MS. BURNETT: We have received HRIPT data on hazelnut oil. I'm not sure which species. Might be both, might be just one of them.

DR. MARKS: So that really has no relevance to this issue of the arachidonic acids. So, do you feel comfortable, Diane, at this point?

DR. BELSITO: But we don't have the composition of all the vegetable oils that we're reviewing in this document.

DR. MARKS: Well, we have, what, 250, approximately? Do you think we're going to get that? Or can we use crossover -- cross-reading when we say rice is safe. And that was the one that, Dan, you altered?

DR. BELSITO: But that had 5 percent. We don't know that some of them that are out there that we don't know composition for could have 85 percent arachidonic acid. We just -- if we -- I think if we don't know the composition, you know, and perhaps we can get this from Dr. Dan's -- I don't know if you already sourced that or not. But I think we really -- since arachidonic acid has not been found to be safe, then I think we need to know the composition of all the vegetable oils that we're going to say are safe. And if we don't have a composition, then the data would be insufficient for composition. Specifically, of arachidonic acid.

DR. MARKS: Or, another way to handle that, Don, would be to come to a conclusion, again, using a disqualifier that it doesn't contain -- if we want to quantify it -- arachidonic acid above a certain level or whatever. I don't know. That would be another -- rather than what I'm afraid is, we're going to go down 250, get a list, and we're only going to have a small number that has arachidonic acid levels in it. But I'm not sure that we haven't looked yet.

DR. BELSITO: I think if you do that, then you'd have to justify it with a QRA. And you'd have to go back and look at the dermal carcinogenicity studies that we looked at for arachidonic acid, and do some type of QRA. And I don't know, based on the literature, if that's doable. But then, if we're going to do that, we might as well open the arachidonic acid report before we do it. But I don't think you can say, you know, because we allowed wheat germ oil at 5 percent to go forward that everything else -- and where are we getting this 5 percent? Simply from -- or look at the data from rice germ oil, rather. Look at that data and see what kind of data did we specifically have on rice germ oil in that safety report. Or were we doing read-across on rice?

DR. BERGFELD: Alan?

DR. ANDERSEN: I -- it's interesting that all of the composition reports that were available when we reviewed the rice group -- only one study from '86 demonstrated any arachidonic as a component. There's '99, 2000, 2002, subsequent with no arachidonic acid identified in the composition.

So, it's -- the data that show -- and the 1986 report was at 5.48 percent arachidonic. So, it wasn't a huge composition issue, and it hasn't been repeated in subsequent analyses. I don't know, Christina, if we have additional data beyond that. But it's just -- it wasn't a significant issue and maybe even wasn't a real issue, which probably is why the panel didn't flag it when we did the rice.

DR. BERGFELD: Dan, please?

DR. LIEBLER: I just want to suggest that I think the minimal level of due diligence that this panel should apply is to known the compositions of the products that we're talking about here. And in the case of the oils, the main products are the oils that stearified in these triglycerides. So, I'm not comfortable even though we might suspect that plant oils are all going to be in the range of about C12-C18 with usually no more than two double bonds. I'm not comfortable as taking that as a given without knowing the composition of the other oils. So, I would suggest -- I would not be in favor of -- I would consider lack of composition to be insufficient from the get-go.

DR. BERGFELD: Dr. Hill?

DR. HILL: I was --

DR. BERGFELD: Are you agreeing?

DR. HILL: I was just agreeing with what

he just said.

DR. BERGFELD: Dr. Slaga?

MR. KLAASSEN: One of the problems with, you know, when you're talking about these natural products is the amount of certain oils that you have this year is different than next year. And this -- if it had more rain or less rain or more stress or less stress, you get different components. So it's a little different in that regard.

Now, another question I have is with our real problem here. I mean, what is known about -- Tom maybe has the best background in this. What's known about any fatty acid producing carcinogenesis in the skin? I mean, I can -- you -- there's many theoretical reasons why they might. I assume there have been a fair number of experiments and kind of what's the general knowledge?

DR. SLAGA: There's a lot of data (off mic) free form. But I know of no studies with (off mic) complex oil that has shown to be carcinogenic. It's always the free fatty acids, the unsaturated --

MR. KLAASSEN: (Off mic) triglyceride of any -- it's just not been done or they don't cause --

DR. SLAGA: No, no, there's -- it's a lot been used as vehicles. And the vehicles come out to be negative. It's -- tremendous literature on arachidonic acid, and some other related type of unsaturated fatty acids. But that they do have some type of activity -- not cancer-causing, they're more tumor promoting or enhancing activity.

DR. BERGFELD: Dr. Marks?

DR. MARKS: Dan, maybe you can give Christina some guidance in terms of this -- the composition of each one of these 250. Would you like that in some sort of tabular form where you could have ranges, almost like the use in concentration? Or do you want to see each oil with a composition under it? And if we don't have a composition, then I think the -- what you infer is that it would be an insufficient data.

DR. BELSITO: That's what we want, composition for each of the oils. And for those that don't have composition, they're insufficient pending data on the -- it could be complete composition of arachidonic acid.

DR. LIEBLER: I agree with that. I mean, I think that one of the things that you have to deal with when you decide you're going to take on 200 ingredients is that they all are -- you know, they all have compositions. And we're still responsible for them. The fact that it's a logistical nightmare is really -- doesn't change that fact. We need to know the composition of these ingredients.

So, ultimately there would have to be a table. A huge mega table of some sort that would have all that information in it. I realize that would be a terrible pain in the neck. There might be some other way -- graphical way to illustrate the composition trends across oils. If that turns out to be important, I have a feeling there'll just be a cluster of points from C12-C18 for most of these. But we -- I think we just have to look.

DR. BRESLAWEC: May I ask a question? Dr. Liebler, if you look at Table 3, CIR Panel Book 33, as an example, the compositions as we -- as available are presented for a for a number of oils on those pages. Is that adequate in terms of composition for those oils?

DR. LIEBLER: Yes, that's fine.

DR. BRESLAWEC: Thank you.

DR. SLAGA: The fact that we want to combine nut oil and the edible plant oils, wouldn't this be the opportunity then to combine it all and try to get all the compositions at one time?

DR. BELSITO: Exactly.

DR. BERGFELD: Is there a general agreement to combine these two documents? It's sort of a straw vote, all those in favor --

DR. BELSITO: Yes.

DR. BERGFELD: Yes. Good. So, now we're needing a motion to how we're going to act

on this. Is it going to go insufficient, or is it going to go tabled, both for the same reason -- composition.

DR. BELSITO: Well, this is the first time we're looking at it, so go insufficient and try and get the composition data.

DR. BERGFELD: And so that's a motion? Motion? Is it seconded?

DR. BELSITO: Yes.

DR. MARKS: Second.

DR. BERGFELD: Any further discussion, then? Dr. Bailey, any discussion?

DR. BAILEY: No, I think these are reasonable explorations. I think the reality of ingredients that are botanical or isolated from natural sources is that the table is not going to be complete. But it's worth, you know, adding as many interests as we can, and then if we find patters that we're comfortable with, then that may suffice. But, you know, expanding the table, I think, is a reasonable step.

DR. BERGFELD: Thank you. Any other comments? Seeing none, call for the vote. All those in favor of going insufficient notice? Thank you, unanimous. So, we've now covered the nut oils as well, because they're being grouped with the plant oils. We're moving on to triclosan. Dr. Belsito.

DR. BELSITO: Yes, triclosan. This is the first time that we're seeing the report, and I'd like to congratulate the CIR staff for taking a novel approach to what otherwise could have been an extremely overwhelming document, given the plethora of studies in the literature on this antimicrobial.

And the approach that the CIR took was first to identify issues surrounding triclosan -- safety issues where we'd like to key in. And those included the exposure -- so, how were we being exposed to it in cosmetics? Potential dioxin impurities, photostability in dioxin, photo products, carcinogenicity, potential endocrine disruption, and then the potential for the bacterial resistance.

REPORT

Draft Tentative Report

Plant-Derived Edible Oils, and Other Derivatives as Used in Cosmetics

November 18, 2010

The 2010 Cosmetic Ingredient Review Expert Panel members are: Chairman, Wilma F. Bergfeld, M.D., F.A.C.P.; Donald V. Belsito, M.D.; Ronald A. Hill, Ph.D.; Curtis D. Klaassen, Ph.D.; Daniel C. Liebler, Ph.D.; James G. Marks, Jr., M.D.; Ronald C. Shank, Ph.D.; Thomas J. Slaga, Ph.D.; and Paul W. Snyder, D.V.M., Ph.D. The CIR Director is F. Alan Andersen, Ph.D. This This report was prepared by Christina Burnett and Monice Fiume, Senior Scientific Analysts/Writers, CIR.

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INTRODUCTION

Oils derived from edible vegetables, fruits, seeds, and tree and ground nuts have been safely consumed by humans for millennia. While nuts and some fruits and vegetables themselves may cause allergic reactions in certain individuals, the refined oils derived from these plants generally pose no significant safety concern following oral exposure, and their general biology is well characterized due to extensive use in food materials. This safety assessment will focus solely on the basic chemistry, manufacturing/production, uses, and irritation and sensitization data available on these oils as they are used in cosmetic ingredients.

Various oils have been used on the skin since antiquity. Initially used for anointing in religious ceremonies, oils and their components have also been long used on the skin for cosmetic purposes. They are used in a wide variety of cosmetic products for their skin conditioning, occlusive, emollient, moisturizing and other properties. The full list of ingredients in this report, which includes oils, hydrogenated oils, unsaponifiables, oil fatty acids, and salts of the fatty acids, is found in Table 1. While a large number of oils derived from plants are included in this literature review, there is a commonality in that they all are mixtures of triglycerides containing fatty acids and fatty acid derivatives, the safety of which in cosmetics have been established.

In preparing this report, numerous inconsistencies were noted with both taxonomic and INCI naming conventions. This report includes the macadamia nut ingredients, Macadamia Integrifolia Seed Oil and Macadamia Ternifolia Seed Oil, which are described in the International Cosmetic Ingredient Dictionary and Handbook.[1] The species *M. integrifolia* is currently the only species of macadamia nut that is used for oil production. The name *M. ternifolia* is an old naming convention for the edible nut that is currently used to describe a non-cultivated, inedible species.[2,3] Macadamia Integrifolia Seed Oil and Macadamia Ternifolia Seed Oil are the same ingredient. Similar naming conflicts have been discovered with Titicum Vulgare (Wheat) Germ Oil and Triticum Aestivum (Wheat) Germ Oil, Orbignya Oleifera Seed Oil and Orbignya Speciosa Kernel Oil, and Moringa Pterygosperma Seed Oil and Moringa Oleifera Seed Oil, with these pairs being synonyms for each other. The shea plant also has two species names, *Butyrospermum parkii* and *Vitellaria paradoxa*. Only *B. parkii* (as Butyrospermum Parkii [Shea] Oil or Butter) is the current naming convention described by the cosmetics industry.

This report includes cosmetic ingredients that have been previously reviewed by the Cosmetic Ingredient Review Expert Panel. The ingredients, their conclusions, and published citations are found in Table 2. Previously reviewed fatty acids and glyceryl triesters are also found in Table 2.

CHEMISTRY

The group of ingredients characterized as fats and oils are the glyceryl esters of fatty acids (triglycerides) normally found in plants, including those which have been hydrogenated to reduce or eliminate unsaturation.[4] Figure 1 represents the general structure of fats and oils. The raw oil may include diglycerides, monoglycerides, free fatty acids, plant sterols, pigments, glucosides, proteins, natural antioxidants, vitamins and impurities.[5,6] The extent to which these components are removed during processing varies. (The CIR Expert Panel has previously reviewed PEG Soy Sterols and concluded they were safe for use in cosmetic ingredients.[7]) The available information on chemical properties of oils in this report, including Food Chemicals Codex specifications when provided, are found in Table 3.[8] The available fatty acid compositions for the oils in this report are found in Table 4.

The percentage of chemical constituents in individual oil types is dependent on the region where the oilseed plant is grown, individual cultivars, and plant genetics.[6] This is especially true with rapeseed, where the erucic acid content varies from 1% to 58.6%. Low erucic acid rapeseed oil is also known as canola oil.

The nutritional content of these oils varies with oil type. For example, sunflower oil contains high levels of vitamins A, D, and K, while palm oil is a rich source of vitamins A and E. Crude sunflower oil also has the highest content of vitamin E in the form of α-tocopherol amongst vegetable oils.[6]

Processing

Oils used in cosmetics are probably produced using the same process used in the food industry. Depending on the source, oil may be directly expressed from the source (seed or pulp) followed by solvent extraction. *Bailey's Industrial Oil and Fat Products* states that the removal of pigments and polar materials is mandatory for most cosmetic applications.[9] The process used for oil refining for foods may be adequate for this purpose, or additional steps may be required. Special refining methods to yield colorless and odorless oils are used by the cosmetic industry and include proprietary adsorption chromatography and supercritical fluid extractions.

The majority of the oils presented in this report are produced either from mechanical extraction or solvent extraction or a hybrid of both methods, known as prepress solvent extraction.[6] In solvent extraction, hexane is the most commonly used solvent as it is economical and has low toxicity potential when compared to other solvents. Seeds that are rich in oil can be cold pressed to extract oil without the use of solvents.[10]

After the initial extraction by methods such as solvent extraction, the crude (degummed) oil is often refined.[6] The first step is treating the oil with caustic soda to neutralize free fatty acids, hydrolyze phosphatides, and remove some colored pigments and unsaponifiable materials. Soap stock is usually a by-product of this step. The next step involves bleaching the neutralized oil with activated earth to further adsorb pigments. The last major step in refining oil is deodorizing, usually by a type of steam distillation, which is intended to remove all oxidative cleavage products that impart odor or flavor to the oil. Deodorization also removes tocopherols, sterols, and other minor constituents of free fatty acids and undesirable foreign materials. Figure 2 is a flowchart of the basic refinement process.

After deodorization, oils can be further processed by hydrogenation, which makes oil more resistant to oxidative and thermal damage, and by winterization, where oil is slowly cooled to promote formation of crystals that cause cloudiness, and then filtered to remove the crystals.

Cosmetic grade edible plant oils may include a physical refining step that involves heating crude oil under vacuum.[10] This step allows for the removal of volatile components such as color compounds, odor compounds, and free fatty acids, which gives the refined oil a lighter color, less odor, and lower acid values.

Analytical Methods

Near infrared spectroscopy and gas chromatography have been used, respectively, to phenotype and analyze fatty acid profiles in shea fat (described as *Vitellaria paradoxa*, not *Butyrospermum parkii*).[11] The fatty acid composition of hazel seed oil (*Corylus avellana*, in crude form) has also been analyzed by gas chromatography.[12] The triacylglycerol and diacylglycerol composition oils from hazelnut, pistachio, almond, Brazil nut, and macadamia nuts have been characterized with high-performance liquid chromatography with atmospheric pressure chemical ionization and UV detection.[13] The triacylglycerol profile of Brazil nut oil has also been quantified using dry matrix-assisted laser desorption/ionization time-of flight mass spectrometry.[14]

Impurities

Proteins

Many edible oils are derived from foods that are recognized as potent food allergens. It has been shown that often an individual that is allergic to a food will generally not react to the refined oil, especially if the oil has been "hot-pressed" or has undergone more processing.[15,16] A prime example is Arachis Hypogaea (Peanut) Oil. Peanuts are extremely allergenic to a large

population, but reaction to the oil is rare. In its safety assessment on Arachis Hypogaea (Peanut) Oil, the Expert Panel noted that the major concern associated with allergic reactions to peanuts is the protein.[17] The protein does not partition into the refined oil, and therefore the oil is safe for use in cosmetics. However, researchers have reported protein levels in processed oils. . Halsey et al. reported that Lowry protein determinations of cold-pressed and refined sunflower oil found 2-8 μg/ml protein,[18] while Zitouni et al. reported trace amounts of protein in the refined oil.[19] Olszewski et al. found 0.1-0.2 μg protein per g of peanut oil,[20] while Ramazzotti et al. reported finding IgE responsive residual proteins in peanut oil extracts.[21] Porras et al. found soy protein in some samples of soy oil, but not others.[22] Awazuhara et al. reported 1.4-4.0 μg protein per 100 g of soy oil.[23] Although Paschke et al. found approximately 35 μg/l protein content in refined soybean oil, no IgE-binding activity was detectable.[24]

The Panel has found a general lack of clinical effects for edible oils already reviewed,[17,25-33] other groups have raised concerns. The European Medicines Agency (EMEA) Working Party on Herbal Medicinal Products concluded that soy and peanut products "should be treated as allergenic unless they have an analytically-monitored non-allergenic specification and a safe maximum daily dose."[34] The EMEA found that threshold concentrations for induction of a protein contact dermatitis were not available and recommended that "all medications for topical use containing soya or peanut products should be treated as allergenic."

Aflatoxin

Aflatoxins are metabolic products of the molds *Aspergillus flavus* and *Aspergillus parasiticus*. They are most often produced in stored agricultural crops (such as peanuts and other nut crops) when growth conditions and genetic requirements are favorable.[35-37] The International Agency for Research on Cancer (IARC) categorized aflatoxins as group 1 agents, "carcinogenic to humans".[38,39]

The United States government places the following limitations on peanuts to be considered "negative" for aflatoxin: ≤ 15 ppb for "peanuts which have been certified as meeting edible quality grade requirements" and ≤ 25 ppb for "non-edible quality categories" (7 CFR Sections 997.30 and 998.200).

A study reported that crude peanut oil (obtained by solvent extraction or hydraulic pressing) has reduced aflatoxin concentration compared to peanut kernels, and that subsequent processing (alkali refining and bleaching) reduces the concentration still further.[17] In one example, processed peanut oil from moldy peanuts (contaminated with 5500 ppb aflatoxin) had an aflatoxin concentration of < 1ppb. [From CIR assessment on Arachis Hypogaea (Peanut) Oil, 2001.][17]

In 50 samples of hazel nuts from Spain, all samples showed fungal contamination, but no aflatoxin contamination.[40] Of the 50 fungal strains identified, 25 were aflatoxigenic strains. In 20 hazel nut samples collected in Egypt, however, aflatoxin (25-175 μg/kg) was reported as a contaminant in 90% of samples. [From CIR assessment on Hazel Seed Oil, 2001.][41]

Aflatoxin contamination of raw and dried coconut copra has been reported.[33] Improper drying, handling, and storage greatly increase the possibility of contamination by aflatoxins growing on copra. Smoke drying of copra inhibited aflatoxin formation. [From CIR assessment on Cocos Nucifera (Coconut) Oil, 2008.][42]

Glycidol

Glycidol and glycidol fatty acid esters have been detected in refined edible oils.[43-46] See CARCINOGENICITY.

USE

Cosmetic

There are 244 oil ingredients included in this safety assessment, 147 of which are reported to be used; 119 of the in-use ingredients have never been reviewed by CIR, while 28 have been reviewed previously. For the ingredients being reviewed for the first time, the frequency of use, as supplied to the Food and Drug Administration (FDA) by industry as part of the Voluntary

Cosmetic Registration Program (VCRP),[47] and/or concentration of use, as supplied by industry in response to a Personal Care Products Council (Council) survey,[48,49] can be found in Table 5a. (Also included in Table 5a are 4 ingredients that do not have identifiable International Nomenclature Cosmetic Ingredient (INCI) names. While these ingredients are not part of this assessment, they are very similar to the oils that are identified and information on them is included in this report for completeness.) For the ingredients that have been reviewed previously, the current and historical[26-28,32,50-53] frequency and concentration of use is given in Table 5b. The 97 ingredients not currently reported to be used are listed in Table 5c.

Of the oils included in this report, Butyrospermum Parkii (Shea) Butter has the most reported uses in cosmetic and personal care products, with a total of 1950; 1680 of those uses are in leave-on formulations. A recent survey of use concentrations for Butyrospermum Parkii (Shea) Butter reports a maximum use concentration of 60% in leave-on products as a cuticle softener, a manicuring application.[54] Helianthus Annuus (Sunflower) Seed Oil has the second greatest number of overall uses reported, with a total of 1414; 1054 of those uses are in leave-on formulations, having use concentrations up to 96%.. Many other ingredients are used in an extensive number of formulations. For example, Prunus Amygdalus Dulcis (Sweet Almond) Oil, Olea Europea (Olive) Fruit Oil, and Glycine Soja (Soybean) Oil have 1127, 915, and 912 uses, respectively. Most of the in-use ingredients have uses in both leave-on and rinse-off product types, many are used in products that are applied around the eye and some are used in a way they can possibly be ingested. Some are used in products that involve mucous membrane exposure, and a few are used in underarm deodorant formulations. Many of the products are used in formulations at relatively high concentrations. Olea Europea (Olive) Fruit Oil is used at up to 100%, Persea Gratissima (Avocado) Oil is used at up to 98%, Helianthus Annuus (Sunflower) Seed Oil at up to 96%, and Glycine Soja (Soybean) Oil at 95%.

Oils are used in a wide variety of cosmetic products for their skin conditioning, occlusive, emollient, moisturizing and other properties. The oil ingredients described in this report may be used in hair sprays, and effects on the lungs that may be induced by aerosolized products containing these ingredients are of concern.

The aerosol properties that determine deposition in the respiratory system are particle size and density. The parameter most closely associated with deposition is the aerodynamic diameter, d_a, defined as the diameter of a sphere of unit density possessing the same terminal settling velocity as the particle in question. In humans, particles with an aerodynamic diameter of $\leq$ 10μm are respirable. Particles with a d_a from 0.1 - 10μm settle in the upper respiratory tract and particles with a $d_a < 0.1$ μm settle in the lower respiratory tract.[55,56]

Particle diameters of 60-80 μm and ≥80 μm have been reported for anhydrous hair sprays and pump hairsprays, respectively.[57] In practice, aerosols should have at least 99% of their particle diameters in the 10 – 110 μm range and the mean particle diameter in a typical aerosol spray has been reported as ~38 μm.[58] Therefore, most aerosol particles are deposited in the nasopharyngeal region and are not respirable.

None of the oils, hydrogenated oils, unsaponifiables, oil fatty acids, and salts of the fatty acids described in this report were restricted from use in any way under the rules governing cosmetic products in the European Union.[59]

Non-Cosmetic

The primary uses for edible oils are for cooking. Palm oil is the world's most widely consumed edible oil (41.7 million metric tons), followed by soybean oil, rapeseed oil, sunflower seed oil, cottonseed oil, peanut oil, palm kernel oil, coconut oil, ,and olive oil.[6,60] Non-food, non-cosmetic uses for edible oils are found in Table 6.

CARCINOGENICITY

The safety of glycidol fatty acid esters in refined vegetable oils was assessed by IARC. Glycidol was determined to be a Group2A (probably carcinogenic to humans) chemical while glycidol fatty acid esters was determined to be a Group 3 (not classifiable as to carcinogenicity to humans) chemical.[45,46]

The Federal Institute for Risk Assessment in Germany released a summary of their initial evaluation of the assessment of levels of glycidol fatty acid esters detected in refined vegetable fats.[44] While acknowledging that the levels of glycidol that may be released from glycidol fatty acid esters are not known, the evaluation noted that glycidol is classified as probably carcinogenic to humans. The evaluation was based on findings of the German Chemical and Veterinary Test Agency (CVUA).

In a presentation by Weisshauer from the CVUA, it was noted that glycidol is converted to 3-chloropropanediol and it appeared to be the 3-chloropropanediol that was detected.[43] The levels of 3-chloropropanediol were negligible at the crude oil, degummed, neutralized, and bleached stages, but levels were significant at the deodorized stage.

Anacardium Occidentale (Cashew) Seed Oil

Singh et al. investigated the modulatory effect of Anacardium Occidentale (Cashew) Seed Oil on antioxidant potential in female Swiss albino mice in a 120 day skin papillomagenesis study.[61] The mice were divided into 4 groups of 15 and 1 group of 10 (vehicle control). Test groups were as follows: Group I was the vehicle control, receiving 0.1 ml acetone; Group II was the positive control, receiving a single dose of 7,12-dimethylbenz(a)anthracene (DMBA) (0.005 mg/0.05 ml acetone) followed by applications of 2% croton oil 3 times a week until study termination; Group III received a single dose of DMBA followed by applications of 2.5% cashew nut kernel oil 3 times a week until study termination; Group IV received a single dose of DMBA followed by applications of 5% cashew nut kernel oil 3 times a week until study termination; and Group V was 5% cashew nut kernel oil applied until study termination. The oil was applied to the clipped dorsal scapular region that was 2 cm in diameter. Body weights were recorded at regular intervals. Skin papillomas greater than 1 mm in diameter at the application sites were recorded weekly and included in the data analysis if they persisted for more than 2 weeks. The positive control group yielded expected results (86% tumor incidence). No tumors were observed in the vehicle control or the other test groups. The authors concluded that cashew nut kernel oil did not exhibit any solitary carcinogenic activity.

ANIMAL TOXICOLOGY

All oils in this assessment are edible. Consequently, their systemic toxicity potential is not of concern and is not addressed in this report. The safety focus of use of these oils as cosmetic ingredients is on the potential for irritation and sensitization. Available irritation, sensitization and phototoxicity data are summarized. When available, information from previous CIR reports on edible oils is included.

Dermal Irritation/Sensitization/Phototoxicity

Adansonia Digitata Seed Oil [Baobab]

In an alternative to the Draize test, 100% baobab oil was tested for dermal irritation in a MatTek EpiDerm ™ MTT viability assay.[62] The MatTek EpiDerm™ tissue samples were incubated with 100 µl of the test material for 1, 4, or 24 h along with the positive control material, 1% Triton X-100, which was incubated for 4 or 9 h, and the negative control, undosed tissues, which were incubated for 4 h. After treatment, the viability of the tissues was determined with MTT uptake and conversion. The positive control provided expected results. The test material was classified as non-irritating.

Arachis Hypogaea (Peanut) Oil

> Undiluted technical grade Arachis Hypogaea (Peanut) Oil was moderately irritating to rabbits and guinea pig skin and mildly irritating to rat skin following exposure; there was no indication that the test site was occluded. However, in a 48 h occlusive patch test using miniature swine, technical grade Arachis Hypogaea (Peanut) Oil was not irritating
> From the CIR Final Report on the Safety Assessment of Peanut (Arachis Hypogaea) Oil, Hydrogenated Peanut Oil, ...[17]

Hartley and/or Himalayan guinea pigs were used to determine the sensitization potential of Arachis Hypogaea (Peanut) Oil. Single drops of a store-bought peanut oil were applied to an area clipped free of hair on the backs of 4 guinea pigs. Applications were made at 2-6 wk intervals, for a total of 7 applications over a 5-mo period. It appears that the test sites were not covered. The test sites were scored 24 h after application. Well-defined erythema was considered a positive reaction. None of the animals had a positive reaction following the initial application. Two animals had positive reactions following application at wks 6 and 12, while one animal had a positive reaction following dosing at wk 12 only.[17]

Butyrospermum Parkii (Shea) Butter

In an acute dermal irritation study, 3 New Zealand White male rabbits received 0.5 ml of Butyrospermum Parkii (Shea) Butter (concentration not reported) under a patch on the shaved doro-lumbar region of each rabbit.[63] The occluded patches were left in place for 4 h. After removal, the treated skin was observed for reactions after 30 min and then on days 2, 3, and 4. Very slight erythema with or without very slight edema was observed in 2 rabbits. These reactions were resolved on days 3 or 4. No reactions were observed in the third rabbit.

Butyrospermum Parkii (Shea) Butter was assessed for skin sensitizing potential in a guinea pig maximization test.[64] During the induction phase, 10 female albino Hartley/Dunkin guinea pigs received injections of diluted Freund's complete adjuvant, 75% (v/v) Butyrospermum Parkii (Shea) Butter in liquid paraffin, and 75% (v/v) Butyrospermum Parkii (Shea) Butter in a 50:50 mix of Freund's complete adjuvant and liquid paraffin. The injections were made to clipped dorsal skin of the scapular region. After 1 week, the same sites were clipped and patches containing Butyrospermum Parkii (Shea) Butter (as received, concentration not reported) were applied and occluded for 48 h. During the induction, 5 control animals were treated in the same manner as the test animals except they did not receive the test compound. Two weeks after the induction phase, test and control animals were challenged with 0.2 ml 20% and 50% (v/v) Butyrospermum Parkii (Shea) Butter in liquid paraffin on shaved posterior and anterior flanks, respectively, for 24 h. After the challenge patches were removed, the test sites were observed for reactions after 24, 48, and 72 h. No evidence of delayed contact hypersensitivity was observed in any of the test animals.

In a phototoxicity study, 15 female Pirbright white guinea pigs were treated with 50 µl of 10% and 20% Butyrospermum Parkii (Shea) Butter diluted in acetone on shaved skin.[65] The guinea pigs also received the positive control, 5% 8-methoxypsoralen in acetone. Another site was left un touched and served as a negative control. Ten guinea pigs were then irradiated with UV-B light for 80 seconds followed by UV-A light for 80 min. The five guinea pigs that were not irradiated served as controls. The positive controls yielded expected results. No skin reactions were observed in animals that received the test material and were irradiated. It was concluded that Butyrospermum Parkii (Shea) Butter was not phototoxic.

Carthamus Tinctorius (Safflower) Oil

> Undiluted Carthamus Tinctorius (Safflower) Seed Oil was minimally irritating in a repeat open patch test using rabbits and was not a primary irritant or sensitizer in a maximization study using guinea pigs.
> From the CIR Final Report on the Safety Assessment of Safflower Oil.[32]

Cocos Nucifera (Coconut) Oil

> Undiluted Cocos Nucifera (Coconut) Oil, hydrogenated coconut oil, and coconut acid were non- to minimally irritating to rabbit skin. In single-insult occlusive patch tests of a 5% aq. solution of a bar soap containing 13% sodium cocoate, scores of 1.6-4.0/8.0 were re-

ported. In guinea pigs, neither undiluted Cocos Nucifera (Coconut) Oil or hydrogenated coconut oil were sensitizers in studies using the Magnusson-Kligman maximization and Buehler methods, respectively.

From the CIR Amended Safety Assessment of Cocos Nucifera (Coconut) Oil, Coconut Acid, ...[33]

Corylus Avellana (Hazel) Seed Oil

A comedogenicity study was conducted in which 0.1 ml of Corylus Avellana (Hazel) Seed Oil (pH 6) was applied to the pinna of the ear of albino rabbits. No local irritation was noted at the application site. A "slight difference in the number and size of the pilosebaceous follicles" was noted via magnifying glass. A "slight excess of sebum and a dilation of the follicles" was noted upon microscopic examination of the treated areas.

From the CIR Final Report on the Safety Assessment of Corylus Avellana (Hazel) Seed Oil, Corylus Americana (Hazel) Seed Oil, ...[40]

Elaeis Guineensis (Palm) Oil

Undiluted Elaeis Guineensis (Palm) Oil was practically non- to minimally irritating to rabbit skin. Elaeis Guineensis (Palm) Oil, 5%, was non-allergenic in a maximization study. A facial lotion containing 1.5% Elaeis Guineensis (Palm) Oil was not phototoxic in the phototoxicity yeast assay.

From the CIR Final Report on the Safety Assessment of Elaeis Guineensis (Palm) Oil, Ekaeis Guinneensis (Palm) Kernel Oil, ...[26]

Gossypium Herbaceum (Cotton) Seed Oil

Cosmetic formulations containing 3.4-8.97% hydrogenated cottonseed oil were not irritating to rabbit skin.

From the CIR Final Report on the Safety Assessment of Hydrogenated Cottonseed Oil, Cottonseed (Gossypium) Oil, ...[27]

Hippophae Rhamnoides Oil [Sea-Buckthorn]

In an acute dermal irritation study, albino rabbits were treated with 0.5ml Hippophae Rhmanoides seed oil for 4 h under a semi-occluded patch.[66] An adjacent untreated area of skin served as a control. After patches were removed, the skin was cleaned of residual test material and observed for reactions at 1, 24, 48, and 72 h post-patch removal. No irritation was observed.

Olea Europea (Olive) Fruit Oil

Hartley and/or Himalayan guinea pigs were used to determine the sensitization potential of Olea Europea (Olive) Fruit Oil.[67] Single drops of a USP-grade olive oil that had been stored in its original metal container for 10 yrs were applied to an area clipped free of hair on the backs of 12 guinea pigs. (The composition of the oil was not determined.) Applications were made at 2-6 wk intervals over a period of 5 mos. Four guinea pigs were treated similarly using store-bought virgin olive oil. None of the animals had a positive reaction following the initial application of either oil. Using the 10-yr-old olive oil, 11 of 12 of the animals had a positive reaction at some point during the study. Some, but not all, of these guinea pigs reacted consistently following the first positive reaction; 2 animals had only one positive reaction. Two guinea pigs in this group died by wk 16. In the group dosed with virgin olive oil, one animal had a positive reaction at wk 2 and one animal had a positive reaction at wks 4 and 6.

Twenty-two guinea pigs sensitive to the 10-yr-old USP olive oil were used to determine cross-reactivity with the store-bought virgin olive oil, another store-bought olive oil (not specified as virgin olive oil), corn oil, and peanut oil. The 5 oils were applied simultaneously to the backs of the guinea pigs. Eighteen of the animals reacted to the virgin olive oil, and 18 reacted to the other store-bought olive oil. (Overlap of these animals was not complete.) Cross-reactivity to corn or peanut oil was not observed.

The researchers then applied single drops of the unsaponifiable fraction of the 10-yr-old oil to 8 sensitized and 4 non-sensitized guinea pigs. All of the sensitized animals reacted to the unsaponifiable fraction, while the non-sensitized animals did not react.

Olive oil is used as a vehicle in the murine local lymph node assay (LLNA), an assay developed to assess a chemical's potential to induce allergic contact dermatitis in humans.[68] The LLNA protocol states that the solvent/vehicle should be selected on the basis of maximizing the test concentrations while producing a solution/suspension suitable for application of the test substance. The recommended vehicle is acetone/olive oil (4:1 v/v).

Oryza Sativa (Rice) Bran Oil and Germ Oil

Undiluted Oryza Sativa (Rice) Bran Oil was not irritating to rabbits, and in a guinea pig maximization study, no reactions were observed when 5% was used at induction and 25% and 50% Oryza Sativa (Rice) Bran Oil were used at challenge. Oryza Sativa (Rice) Germ Oil was not a primary dermal irritant, and a Oryza Sativa (Rice) Bran Oil / Oryza Sativa (Rice) Germ Oil mixture, concentrations not stated, did not cause a contact allergy response. Undiluted hydrolyzed rice protein was also not irritating or sensitizing. Undiluted Oryza Sativa (Rice) Bran Oil and Oryza Sativa (Rice) Germ Oil, ≤75%, were not phototoxic or photosensitizing.

From the CIR Amended Final Report on the Safety Assessment of Oryza Sativa (Rice) Bran Oil, Oryza Sativa (Rice) Germ Oil, ...[28]

Prunus Amygdalus Dulcis (Sweet Almond) Oil

Undiluted Prunus Amygdalus Dulcis (Sweet Almond) Oil and two moisturizer formulations, each containing 25% Prunus Amygdalus Dulcis (Sweet Almond) Oil, were tested for skin irritancy in rabbits using occlusive patches. Undiluted Prunus Amygdalus Dulcis (Sweet Almond) Oil was nonirritating (PII = 0/4). The formulations containing 25% Prunus Amygdalus Dulcis (Sweet Almond) Oil were minimally irritating (PIIs = 0.28 and 0.72, respectively).

In a 60-day cumulative irritation test, 10 and 100% Prunus Amygdalus Dulcis (Sweet Almond) Oil was applied to rabbits. When tested in 7 separate trials, 100% Prunus Amygdalus Dulcis (Sweet Almond) Oil produced mean maximum irritation indices (MMIIs) ranging from 0.34 to 1.34 (maximum score = 8). At a concentration of 10%, MMIIs for this ingredient ranged from 0 to 0.66. Results indicated that, when applied to the skin over a long period of time, Prunus Amygdalus Dulcis (Sweet Almond) Oil is slightly irritating; whereas, at 10% it is practically nonirritating.

A maximization assay was used to determine the sensitizing potential of Prunus Amygdalus Dulcis (Sweet Almond) Oil. using guinea pigs[69] Intradermal induction used concentrations of 5% Amygdalus Dulcis (Sweet Almond) Oil, the dose-range phase of the experiment used a single dermal application of 5%, 10%, or 100% Prunus Amygdalus Dulcis (Sweet Almond) Oil, a booster induction injection of 100% Prunus Amygdalus Dulcis (Sweet Almond) Oil was applied occlusively for 48 h 1 wk later, challenge was with 5% Prunus Amygdalus Dulcis (Sweet Almond) Oil in petrolatum applied topically under occlusion for 24 h. Prunus Amygdalus Dulcis (Sweet Almond) Oil was nonsensitizing.

Undiluted Prunus Amygdalus Dulcis (Sweet Almond) Oil was tested for irritancy in groups of 6 male albino rabbits.[69] The test material was applied under occlusion to the clipped intact and abraded dorsal skin of each animal. Twenty-three hours later, patches were removed; sites were scored at 24 and 48 hours. The Primary Irritation Indices (PIIs) for seven test samples of Prunus Amygdalus Dulcis (Sweet Almond) Oil ranged from 0 to 0.18 (maximum score = 8), indicating that this ingredient is practically nonirritating to skin.

From the CIR Final Report on the Safety Assessment of Sweet Almond Oil and Almond Meal. [69]

Sesamum Indicum (Sesame) Seed Oil

Undiluted Sesamum Indicum (Sesame) Seed Oil was non- or minimally irritating to rabbit skin.

From the CIR Amended Safety Assessment of Sesamum Indicum (Sesame) Seed Oil, Hydrogenated Sesame Seed Oil, ...[53]

Triticum Vulgare (Wheat) Germ Oil

Triticum Vulgare (Wheat) Germ Oil, undiluted and at 2% in formulation, was non- to mildly irritating, and undiluted Triticum Vulgare (Wheat) Germ Oil was not sensitizing to guinea pigs.

From the CIR Final Report on the Safety Assessment of Whet Germ Oil.[30]

Zea Mays (Corn) Oil

A group of 6 Hartley and/or Himalayan guinea pigs were used to determine the sensitization potential of store-bought corn oil. [67] None of the animals had a positive reaction following the initial application. Two animals had positive reactions following application at wks 4 and 6, while one animal had a positive reaction following application at wk 12.

Ocular Irritation

Adansonia Digitata Seed Oil [Baobab]

In an alternative to the Draize rabbit eye test, 100% baobab oil was tested for ocular irritation in a MatTek EpiOcular ™ MTT viability assay.[62] The MatTek EpiOcular™ tissue samples were treated with 100 µl of the test material for 16, 64, or 256 minutes along with the positive control material, 0.3% Triton X-100, which was treated for 15 or 45 minutes, and the negative

control, tissue culture water, which was treated for 16 minutes. After treatment, the viability of the tissues was determined with MTT uptake and conversion. The positive control provided expected results. The test material was classified as non-irritating.

Aleurites Moluccana Seed Oil

In in vitro human conjunctival cell assays and in vivo guinea pig Draize tests, Aleurites Moluccana oil was not cytotoxic and was not an ocular irritant.[70] The same authors tested the efficacy of Aleurites Moluccana oil in ocular burn treatment in vitro and in vivo and did not observe any adverse effects.[71]

Butyrospermum Parkii (Shea) Butter

Undiluted Butyrospermum Parkii (Shea) Butter was tested for acute ocular irritation in 3 male Kleinrussen Chbb:HM rabbits.[72] Approximately 0.1 ml of test material was instilled into the conjunctival sac of the right eye and left for 24h. The left eye served as a control. After 24 h, the eyes were rinsed with warm water. The eyes were observed for reactions for 72 h after application. Conjunctival reactions were mild and disappeared completely within 24 h. No corneal lesions or irital reactions were observed during the test. Butyrospermum Parkii (Shea) Butter was classified as not irritating to mucous membranes in this study.

Cocos Nucifera (Coconut) Oil, Hydrogenated Coconut Oil, Coconut Acid

> Undiluted Cocos Nucifera (Coconut) Oil, instilled into rabbit eyes without rinsing, produced minimal eye irritation.[33] Undiluted hydrogenated coconut oil produecd mild irritation in one study, minimal irritation in another, negligible or minimal irritation in eight additional tests. Two lipstick formulations containing 10% hydrogenated coconut oil both produced slight conjunctivitis. Undiluted coconut acid produced mild irritation in rabbit eyes in two studies and minimal irritation in a third.
> From the CIR Amended Safety Assessment of Cocos Nucifera (Coconut) Oil, Coconut Acid, ...[33]

Elaeis Guineensis (Palm) Oil

> Undiluted Elaeis Guineensis (Palm) Oil and cosmetic lotions and creams containing 1.5-2.0% Elaeis Guineensis (Palm) Oil were minimally irritating to the eyes of rabbits, while one lotion containing 1.5% Elaeis Guineensis (Palm) Oil was moderately irritating. Hydrogenated palm oil suppositories were mildly irritating to rabbit eyes.
> From the CIR Final Report on the Safety Assessment of Elaeis Guineensis (Palm) Oil, Ekaeis Guinneensis (Palm) Kernel Oil, ...[26]

Gossypium Herbaceum (Cotton) Seed Oil

> Cosmetic formulations containing 3.4-12.3% hydrogenated cottonseed oil were mildly irritating to the eyes of rabbits.
> From the CIR Final Report on the Safety Assessment of Hydrogenated Cottonseed Oil, Cottonseed (Gossypium) Oil, ...[27]

Linum Usitatissimum (Linseed) Seed Oil

A mascara containing 9.4% Linum Usitatissimum (Linseed) Seed Oil was tested for eye irritation potential in an in vitro study using neutral red release (NRR), hen's egg test on chorio-allantoic membrane (HET-CAM), and reconstituted human epithelial culture (REC) assays.[73] For the NRR assay, the test product was diluted at 0%, 5%, 15%, 25%, 35%, and 50% in mineral oil. The NR_{50} of the test product was greater than 50% and the test product was considered slightly cytotoxic. In the HET-CAM assay, the score was 6.25 and the test product was considered moderately irritating when applied under a 67.1% solution in mineral oil. Finally in the REC assay, the cumulative simplified mean cytotoxicity index (SMCI) was calculated to be 0.25 and the test product was considered slightly cytotoxic when applied under a 66.9% solution in mineral oil. Overall, the study concluded that the mascara containing 9.4% Linum Usitatissimum (Linseed) Seed Oil may be slightly irritating.

Olea Europea (Olive) Fruit Oil

The ocular irritation potential of high purity Olea Europea (Olive) Fruit Oil was evaluated using in vivo and in vitro testing.[70] In vivo, a Draize test was conducted using New Zealand rabbits. (The number of animals used was not specified.) Undiluted Olea Europea (Olive) Fruit Oil was not an ocular irritant in this test. Using human conjunctival epithelial cells in an in vitro study, Olea Europea (Olive) Fruit Oil did not induce cellular necrosis or apoptosis.

Oryza Sativa (Rice) Bran and Rice Germ Oil

A mixture of Oryza Sativa (Rice) Bran Oil and Oryza Sativa (Rice) Germ Oil, concentrations not stated, were not irritating to rabbit eyes. Undiluted Oryza Sativa (Rice) Bran Oil was considered minimally irritating, and Oryza Sativa (Rice) Germ Oil, concentration not stated, was not a primary irritant.

From the CIR Amended Final Report on the Safety Assessment of Oryza Sativa (Rice) Bran Oil, Oryza Sativa (Rice) Germ Oil, ...[28]

Prunus Amygdalus Dulcis (Sweet Almond) Oil

The ocular irrtation potentials of undiluted Prunus Amygdalus Dulcis (Sweet Almond) Oil and cosmetic formulations containing up to 25% Prunus Amygdalus Dulcis (Sweet Almond) Oil were evaluated using rabbits. Undiluted Prunus Amygdalus Dulcis (Sweet Almond) Oil was practically nonirritating or minimally irritating, and formulations containing up to 25% Prunus Amygdalus Dulcis (Sweet Almond) Oil were nonirritating to minimally irritating. In most instances, reactions that occurred were limited to conjunctival irritation, which cleared by the third day of observation.

From the CIR Final Report on the Safety Assessment of Sweet Almond Oil and Almond Meal. [69]

Ribes Nigrum (Black Currant) Seed Oil

A 50% dilution of an eye mask containing 0.2% Ribes Nigrum (Black Currant) Seed Oil was tested in a HET-CAM assay.[74] Two eye gels with vitamin E at 50% were used as reference products. The average score was 2.00, where a mean score of 0-4.9 considered "practically none" for irritation potential.

Sesamum Indicum (Sesame) Seed Oil

Undiluted Sesamum Indicum (Sesame) Seed Oil was non- to minimally irritating to rabbit eyes, and a lipstick containing 10-11% Sesamum Indicum (Sesame) Seed Oil was not an ocular irritant.

From the CIR Amended Safety Assessment of Sesamum Indicum (Sesame) Seed Oil, Hydrogenated Sesame Seed Oil, ...[53]

Triticum *Vulgare (Wheat) Germ Oil*

Undiluted Triticum Vulgare (Wheat) Germ Oil was, at most, a minimal ocular irritant, and 2% in a water emulsion was not irritating.

From the CIR Final Report on the Safety Assessment of Whet Germ Oil.[30]

Zea Mays (Corn) Oil

The ocular irritation potential of high purity Zea Mays (Corn) Oil was evaluated using in vivo and in vitro testing.[70] In vivo, a Draize test was conducted using New Zealand rabbits. (The number of animals used was not specified.) Undiluted Zea Mays (Corn) Oil was not an ocular irritant in this test. Using human conjunctival epithelial cells in an in vitro study, Zea Mays (Corn) Oil did not induce cellular necrosis or apoptosis.

CLINICAL ASSESSMENT OF SAFETY

Edible oils are commonly believed to be safe for use on the skin.[9] de Groot notes that no documentation exist to show that high quality edible lipids cause adverse reactions in normal individuals (except for potential comedogenicity).[75] Very few reports of adverse reactions to cosmetic use of edible oils have been reported.

Irritation/Sensitization/Allergenicity/Phototoxicity

Many edible oils are derived from foods that are recognized as potent food allergens. The allergic reactions are thought to be caused by the proteins present in the food. It has been shown that often an individual that is allergic to a food will generally not react to the refined oil, especially if the oil has been "hot-pressed" or has undergone more processing.[15,16] A prime example is Arachis Hypogaea (Peanut) Oil. Peanuts are extremely allergenic to a large population, but reaction to the oil is rare. In its safety assessment on Arachis Hypogaea (Peanut) Oil, the Expert Panel noted that the major concern associated with allergic reactions to peanuts is the protein.[17] The protein does not partition into the refined oil, and therefore the oil is safe for use in cosmetics. Crevel

et al. also concluded that chemically refined peanut oil is safe for the majority of peanut allergic individuals.[16] They stated that "as peanut is acknowledged to be one of the most potent food allergens, it is reasonable to extrapolate the conclusions drawn up for peanut oil to other edible oils." However, they concede that validated analytical methodology for establishing the protein content of oil is needed.

In support of the conclusions stated earlier, Crevel et al. also examined the allergenicity of some other oils. Very few instances of allergic reactions to other major edible oils have been reported. Even sesame oil, which differs from the other oils in that it is used as a flavorant and, therefore, not as refined and expected to contain significantly more protein that the other edible oils, has had very few reports of allergic reaction. Additional studies demonstrating safety are summarized later in this section.[18,76]

A large amount of clinical irritation and sensitization studies were made available on many of the oils, primarily in formulation, and these studies are summarized in Table 7. All of the data indicated that the oils were not irritants or sensitizers. Also included in this table are summary statements of findings from CIR reports of oils that have previously been reviewed.

Ocular Irritation

Linum Usitatissimum (Linseed) Seed Oil

The ocular irritation potential of a mascara containing 9.4% Linum Usitatissimum (Linseed) Seed Oil was tested in 33 female subjects for 4 weeks.[77] Of the 33 subjects, 16 were contact lens wearers and the remaining 17 were self-assessed sensitive eye non-contact lens wearers. One subject dropped out of the study for non-treatment related reasons. Subjects were evaluated with subjective questionnaires regarding ocular sensation following product use as well as with objective ophthalmic findings. Trace increases in palpebral conjunctival irritation were observed in only one subject, but this result was thought to be non-treatment related by the study investigators. No subjective irritation was reported and no adverse events were reported. The study concluded that the test material was clinically safe for use by contact lens wearers and self-assessed sensitive eye non-contact wearers.

Ribes Nigrum (Black Currant) Seed Oil

An in-use 4 week study was conducted on an eye mask that contained 0.2% Ribes Nigrum (Black Currant) Seed Oil (undiluted) in 52 subjects.[78] Subjects were evaluated by an ophthalmologist and a dermatologist at baseline and at the end of the study. No adverse reactions were observed. The eye mask was considered ophthalmologist tested and safe for contact lens wearers.

Comedogenicity

Ribes Nigrum (Black Currant) Seed Oil

A comedogenicity study of an eye mask containing 0.2% Ribes Nigrum (Black Currant) Seed Oil (undiluted) was performed on 6 subjects.[79] The test material was applied with occlusive patches. The average score was 0.00 comedones/cm^2. The eye mask was found to be non-comedogenic.

Phototoxicity/Photosensitization

Summary statements of phototoxicity/photosensitzation data from CIR reports of oils that have previously been reviewed are summarized below.

Cocos Nucifera (Coconut) Oil and Sodium Cocoate

> Bar soaps made with 13% Cocos Nucifera (Coconut) Oil, tested as a 3% aqueous solution, tested using 10 subjects, a similar soap, prepared as 1 or 3% aqueous solutions, tested on 52 panelists, and bar soaps made with 13% sodium cocoate, prepared as a 3% aqueous solution, tested using 10 subjects did not produce any evidence of photosensitization.
> From the CIR Amended Safety Assessment of Cocos Nucifera (Coconut) Oil, Coconut Acid, ...[33]

Prunus Amygdalus Dulcis (Sweet Almond) Oil

Formulations containing 0.1% - 2.0% Prunus Amygdalus Dulcis (Sweet Almond) Oil, tested for photosensitization in a total of 764 subjects, did not manifest photosensitivity in any of the test subjects.
From the CIR Final Report on the Safety Assessment of Sweet Almond Oil and Almond Meal. [69]

Clinical Trials/Case Studies

Aleurites Moluccana Seed Oil

In an efficacy study of Aleurites Moluccana oil as a topical treatment for psoriasis, 15 patients with mild, stable plaque psoriasis (less than 15% total body surface area) applied "just enough (oil) to moisten the plaque" 3 times daily for 12 weeks. No side effects or adverse events were reported.[80]

Anacardium Occidentale (Cashew) Seed Oil

A 37-year-old male resin researcher presented with painful, edematous erythema with bullae on his right leg after dropping pure Anacardium Occidentale (Cashew) Seed Oil from a bottle on his right thigh.[81] He had removed his clothes immediately and thoroughly washed the skin. The erythema developed 10 days after exposure. Patch testing was performed with cashew nut oil 3% alcohol, cashew nut oil 0.3% alcohol, cashew nut oil 0.03% alcohol, and urushiol 0.01% petrolatum. The patients had a "+" reaction on day 2 and "++" reactions on days 3 and 4 to the 3% dilution, and "+" reactions to the 0.3% dilution and urushiol on days 2-4. A "?+" reaction was observed on days 2 and 3 and a "+" reaction was observed on day 4 to the 0.03% dilution.

Cocos Nucifera (Coconut) Oil

Cocos Nucifera (Coconut) Oil did not produce adverse effects in several therapeutic studies.
From the CIR Amended Safety Assessment of Cocos Nucifera (Coconut) Oil, Coconut Acid, ...[33]

Glycine Soja (Soybean) Oil

Seven patients with a history of immediate hypersensitivity reaction after the ingestion of soybeans were enrolled in a double-blind crossover study.[76] The patients were first skin tested by the puncture method with a crude whole soybean extract, a partially hydrogenated oil, a non-hydrogenated oil, and a cold-pressed soybean oil. Olive oil from a retailer was used as a negative control. Since all 7 patients had negative skin tests to the oils and positive reactions to the crude soybean extract, they were challenged orally with capsules of each of the oils in random order on 4 separate days. None of the patients reacted to the oral challenges. The researchers remarked that while a reaction to the cold-pressed soybean oil did not occur in this study, cold-pressed oils may contain soybean protein and should be avoided.

The sera from 4 patients with known allergy to soybean was used to examine the allergenicity of soy oil proteins.[23] Neither the IgE nor the IgG4 in the sera reacted to protein in the soy oil.

Helianthus Annuus (Sunflower) Oil

Two cases were reported of patients having anaphylactic reactions following ingestion of sunflower seeds.[18] No reactions were seen upon oral or open challenge with refined or cold-pressed sunflower oils, both of which were shown to contain detectable amounts of protein. However, in a case report of a woman who had been desensitized to mugwort (a member of the Compositae family) pollen for a year, but then had an anaphylactic reaction to sunflower (also a member of the Compositae family) seeds, it was found that she had a delayed positive reaction to sunflower oil in a skin prick test.[82] Prick test results with 10 control subjects were negative. In an oral challenge test, a delayed reaction was again observed, with symptoms occurring 2.25-8 h after administration.

Macadamia Seed Oil

A case of cheilitis was reported in a 28-year-old woman that had used a lipstick that contained Macadamia Seed Oil (no species description or concentration of oil were reported).[83] When patch tested with the ingredients contained in the lipstick, the patient had positive reactions to di-isostearyl malate and Macadamia Seed Oil. The patient was told to discontinue use of lipsticks containing these 2 ingredients and her condition improved with steroid ointment.

Olea Europea (Olive) Fruit Oil

Throughout the literature, it is stated that sensitization to Olea Europea (Olive) Fruit Oil is considered rare. Case reports have been described, however, and generally involved patients with venous eczema, some type of dermatitis or lesion, or an occupational exposure. Patch testing with Olea Europea (Olive) Fruit Oil produced positive reactions in most of these cases, and these results were usually regarded as allergenic. The concentrations of Olea Europea (Olive) Fruit Oil tested were not always given, but when stated, test concentrations giving positive results, ranged from 30-100%. In some cases, the constituents of olive oil were tested as well, but the results of that testing were negative.[84-91]

Kränke et al. investigated whether the reactions to olive oil were contact sensitization or irritation, using open and occlusive testing. They concluded that olive oil presented as a weak irritant rather than a contact sensitizer in the few case studies they observed. The capacity to produce an irritant result was increased using occlusive conditions.[92] Zipprich and Hauser remarked that components capable of inducing an irritant reaction can form if the olive oil isn't stored properly.[93]

Persea Gratissima (Avocado) Oil

A case study was reported in which a female subject had dermatitis around the eyes and earlobes.[94] Patch testing with her sunscreen resulted in positive results. In subsequent patch testing of the individual ingredients, a positive reaction to undiluted Persea Gratissima (Avocado) Oil, but not to the active ingredient, was observed. Twenty controls subjects were used, and reactions to Persea Gratissima (Avocado) Oil were not seen.

Sesamum Indicum (Sesame) Seed Oil

A case study was reported in which a woman applied a Chinese ointment containing Sesamum Indicum (Sesame) Seed Oil, resulting in pruritic erythema, papules, and vesicles. [95] Patch testing was performed with the ointment and with the individual ingredients, including undiluted Sesamum Indicum (Sesame) Seed Oil. Both the ointment and Sesamum Indicum (Sesame) Seed Oil produced positive reactions on days 2, 3, 4, and 11. The other components did not cause a reaction. Results were negative in patch testing of Sesamum Indicum (Sesame) Seed Oil using 20 healthy subjects.

SUMMARY

The oils derived from vegetable and fruit plants are composed of mono-, di-, and triglycerides, free fatty acids and other minor components, including natural antioxidants and fat-soluble vitamins. The percentage of chemical constituents and nutritional content of individual oil types is dependent on region where the oil plant is grown, individual cultivars, and plant genetics. Oils used in cosmetics are likely produced in the same manner as those used in the food industry. Oils may be expressed through mechanical or solvent extraction. The oils may undergo further refining, such as neutralizing, bleaching, and deodorizing, to remove pigments, odors, unsaponifiable materials, and other undesirables.

It has been shown that often an individual that is allergic to a food will generally not react to the refined oil. In past safety assessments, the CIR Expert Panel noted that the major concern associated with allergic reactions to foods such as peanuts is the protein. The protein, however, does not partition into the refined oil, and therefore the oil is safe for use in cosmetics. The CIR

Expert Panel also has found a general lack of clinical effects for edible oils that they have already reviewed; however, other researchers have raised concerns about the presence of residual proteins in oils, such as peanut and soy. These ingredients may also contain aflatoxins, metabolic products of certain molds that are carcinogenic to humans.

Of the oils described in this report, Butyrospermum Parkii (Shea) Butter has the most reported uses in cosmetic and personal care products with a total of 1950 and is used at a maximum concentration of 60%. Oils are used in a wide variety of cosmetic products, including use in hair spray and other aerosolized products. None of the oils or the related counterparts described in this report were restricted from use in the European Union.

Glycidol fatty acid esters are possible constituents in refined vegetable oils. While the amount of glycidol that may be present with glycidol fatty acid esters is not known, IARC has noted that glycidol is probably carcinogenic to humans and that glycidol fatty acid esters are not classifiable as to carcinogenicity in humans.

Anacardium Occidentale (Cashew) Seed Oil did not exhibit solitary carcinogenic activity in a study of the modulatory effect on the antioxidant potential of this nut oil.

The safety focus of use of these oils as cosmetic ingredients is on the potential for irritation and sensitization. The available animal data indicate that these ingredients are not dermal irritants or sensitizers.

In acute animal studies, undiluted hydrogenated coconut oil and undiluted Prunus Amygdalus Dulcis (Sweet Almond) Oil were not dermal toxicants in dermal toxicity studies in guinea pigs at doses of 3 g/kg. In a subcutaneous toxicity study, 10% Prunus Amygdalus Dulcis (Sweet Almond) Oil produced nonallergic eosinophilia reactions in guinea pigs.

Undiluted Arachis Hypogaea (Peanut) Oil was moderately irritating to rabbits and guinea pig skin, mildly irritating in rat skin, and non-irritating in miniature swine in dermal studies. Undiluted Cocos Nucifera (Coconut) Oil, hydrogenated coconut oil, and coconut acid were non- to minimally irritating in rabbit skin. Corylus Avellana (Hazel) Seed Oil was not irritating to rabbit skin. Prunus Amygdalus Dulcis (Sweet Almond) Oil at 25% in formulations was minimally irritating; at 10%, it was practically non-irritating, and at undiluted concentrations, it was practically non-irritating to slightly irritating.

In animal sensitization studies, store-bought peanut oil produced well-defined erythema only at 12 weeks in a 5 month guinea pig study. Undiluted Cocos Nucifera (Coconut) Oil and hydrogenated coconut oil were not sensitizers in guinea pig studies. Prunus Amygdalus Dulcis (Sweet Almond) Oil up to 100% was not sensitizing in a guinea pig study.

In dermal irritation studies in animals, Adansonia Digitata Seed Oil, hydrogenated cottonseed oil, Oryza Sativa (Rice) Bran Oil, and Oryza Sativa (Rice) Germ Oil were not irritating. Undiluted Carthamus Tinctorius (Safflower) Seed Oil was minimally irritating in rabbits, but it was not a primary irritant in guinea pigs. Undiluted Elaeis Guineensis (Palm) Oil, Sesamum Indicum (Sesame) Seed Oil, and Triticum Vulgare (Wheat) Germ Oil were practically non-irritating to minimally irritating in rabbits. Carthamus Tinctorius (Safflower) Seed Oil, Elaeis Guineensis (Palm) Oil, Oryza Sativa (Rice) Bran Oil, Oryza Sativa (Rice) Germ Oil, and Triticum Vulgare (Wheat) Germ Oil were non-sensitizing in animal studies. Oryza Sativa (Rice) Bran Oil, Oryza Sativa (Rice) Germ Oil, and Elaeis Guineensis (Palm) Oil were not phototoxic in animal studies.

In animal ocular studies, Adansonia Digitata Seed Oil, Olea Europea (Olive) Fruit Oil, Oryza Sativa (Rice) Germ Oil, Ribes Nigrum (Black Currant) Seed Oil, 10-11% Sesamum Indicum (Sesame) Seed Oil, 2% Triticum Vulgare (Wheat) Germ Oil, and Zea Mays (Corn) Oil were non-irritating. Undiluted Elaeis Guineensis (Palm) Oil and Elaeis Guineensis (Palm) Oil at 2% were minimally irritating to rabbit eyes. Hydrogenated palm oil and 3.4% - 12.3% hydrogenated cottonseed oil were considered mildly irritating. In a HET-CAM study, 9.4% Linum Usitatissimum (Linseed) Seed Oil was slightly irritating. Undiluted Oryza Sativa (Rice) Bran Oil and undiluted Triticum Vulgare (Wheat) Germ Oil were minimally irritating to eyes, while undiluted Sesamum Indicum (Sesame) Seed Oil was non- to minimal ocular irritants.

Aleurites Moluccana Seed Oil was not cytoxic or irritating in in vitro and in vivo ocular efficacy studies. Undiluted Cocos Nucifera (Coconut) Oil and undiluted hydrogenated coconut oil were minimal to mild eye irritants in rabbit eyes, while formulations containing 10% hydrogenated coconut oil produced slight conjunctivitis in rabbit eyes that disappeared after 24-48 h. Undiluted Prunus Amygdalus Dulcis (Sweet Almond) Oil and formulations containing up to 25% Prunus Amygdalus Dulcis (Sweet Almond) Oil were nonirritating to minimally irritating in Draize studies.

Edible oils are believed to be safe for use on the skin and very few reports of adverse reactions have been reported. The proteins that are responsible for allergenic responses in individuals with food allergies do not partition into refined oils.

A large amount of clinical irritation and sensitization studies were made available on many of the oils. All of the data indicated that the oils were not irritants or sensitizers.

A mascara containing 9.4% Linum Usitatissimum (Linseed) Seed Oil was did not produce ocular irritation or adverse effects in contact lenses wearers or subjects with sensitive eyes. An eye mask containing 0.2% Ribes Nigrum (Black Currant) Seed Oil (undiluted) was considered ophthalmologist tested and safe for contact lens wearers.

A comedogenicity study of an eye mask containing 0.2% Ribes Nigrum (Black Currant) Seed Oil (undiluted) found the formulation to be non-comedogenic.

Bar soaps containing up to 13% Cocos Nucifera (Coconut) Oil or sodium cocoate were not photosensitizers in human subjects, nor were formulations containing 0.1%-2% Prunus Amygdalus Dulcis (Sweet Almond) Oil.

In clinical studies, 0.2% Ribes Nigrum (Black Currant) Seed Oil and 9.4% Linum Usitatissimum (Linseed) Seed Oil were not ocular irritants. Ribes Nigrum (Black Currant) Seed Oil at 0.2% was also non-comedogenic. Cases of contact allergy have been reported for Glycine Soja (Soybean) Oil, Helianthus Annuus (Sunflower) Seed Oil, Olea Europea (Olive) Fruit Oil, Persea Gratissima (Avocado) Oil, and Sesamum Indicum (Sesame) Seed Oil. Aleurites Moluccana Seed Oil and Cocos Nucifera (Coconut) Oil did not produce adverse effects in efficacy studies in humans. Anacardium Occidentale (Cashew) Seed Oil and Macadamia Seed Oil caused allergic response in separate case studies.

DISCUSSION

The CIR Expert Panel expressed concern regarding pesticide residues and heavy metals that may be present in botanical ingredients. They stressed that the cosmetics industry should continue to use the necessary procedures to limit these impurities in the ingredient before blending into cosmetic formulation.

Aflatoxins, potent carcinogens, may be present in moldy nuts and coconut copra, but are not found in oils expressed from these nuts and copra. The Panel adopted the USDA designation of $\leq$ 15 ppb as corresponding to "negative" aflatoxin content.

The potential adverse effects of inhaled aerosols depend on the specific chemical species, the concentration and the duration of the exposure and their site of deposition within the respiratory system. In practice, aerosols should have at least 99% of their particle diameters in the 10 – 110 μm range and the mean particle diameter in a typical aerosol spray has been reported as ~38 μm. Particles with an aerodynamic diameter of $\leq$ 10μm are respirable. In absence of inhalation toxicity data, the panel determined that oils derived from edible plants can be used safely in hair sprays, because the product particle size is not respirable.

The Panel considered safety of glycidol and glycidol fatty acid esters in refined vegetable oils. While the Panel recognizes that these impurities may be carcinogenic, absorption through the skin would be very low and likely do not pose the same hazard as through ingestion. Nonetheless, suppliers should take steps to eliminate or reduce the presence of glycidol and glycidol fatty acid esters in plant-based edible oils that are used in cosmetic products.

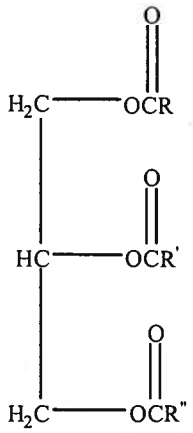
Many edible oils are derived from foods that are recognized as potent food allergens. It has been shown that often an individual that is allergic to a food will generally not react to the refined oil, especially if the oil undergone extensive processing. This is because the proteins responsible for allergic reactions do not partition into the refined oil, and therefore the oil is safe for use in cosmetics. The Panel has found a general lack of clinical effects for edible oils already reviewed.

The Panel agreed that the composition data that were available for these plant-derived edible oil ingredients, combined with the available data on method of manufacture, impurities, safety test data on fatty acids, a long history of safe use in foods, and an absence of adverse reactions in clinical experience would be a sufficient basis for determining safety. Composition data, however, were not available for all of the oils. Additional data are needed to complete the safety assessment of edible oils derived from plants. Chemical composition, specifically fatty acid profiles, of the oils for which those data were not given in the report are needed. These oils include:

*Actinidia Chinensis (Kiwi) Seed Oil
Aleurites Moluccanus Bakoly Seed Oil
Arctium Lappa Seed Oil [Burdock]
*Avena Sativa (Oat) Kernel Oil
*Bassia Butyracea Seed Butter
*Bassia Latifolia Seed Butter [Mahwa]
*Brassica Napus Seed Oil [Rapeseed]
Brassica Olearcea Acephala Seed Oil [Kale]
*Brassica Oleracea Italica (Broccoli) Seed Oil
*Camellia Japonica Seed Oil
*Camellia Kissi Seed Oil [Tea]
*Camellia Sinensis Seed Oil
Canarium Indicum Seed Oil [Galip]
*Caryocar Brasiliense Fruit Oil [Pequi]
*Citrus Limon (Lemon) Seed Oil
Citrus Paradisi (Grapefruit) Seed Oil
Coix Lacryma-Jobi (Job's Tears) Seed Oil
*Corylus Americana (Hazel) Seed Oil
*Crambe Abyssinica Seed Oil [Abyssinian Mustard]
*Elaeis Oleifera Kernel Oil [Palm]
Fragaria Chiloensis (Strawberry) Seed Oil
Fragaria Vesca (Strawberry) Seed Oil
Fragaria Virginiana (Strawberry) Seed Oil
*Gevuina Avellana Oil [Chilean Hazel]
*Hippophae Rhamnoides Oil [Sea-Buckthorn]
*Hippophae Rhamnoides Fruit Oil [Sea-Buckthorn]
Irvingia Gabonensis Kernel Butter [Dika]
Luffa Cylindrica Seed Oil [Luffa]
Lupinus Albus Seed Oil [White Lupine]
Lycium Barbarum Seed Oil [Goji Berry]
Morinda Citrifolia Seed Oil [Noni]
*Olea Europaea (Olive) Husk Oil
*Passiflora Edulis Seed Oil [Passion Fruit]
Plukenetia Volubilis Seed Oil [Sacha Inchi]
*Pyrus Malus (Apple) Seed Oil
Ribes Rubrum (Currant) Seed Oil
*Rosa Canina Fruit Oil [Dog Rose]
Rubus Chamaemorus Seed Oil [Cloudberry]
Schinziophyton Tartanenii Kernel Oil [Mongongo]
*Silybum Marianum Seed Oil [Thistle]
*Solanum Lycopersicum (Tomato) Seed Oil
Solanum Lycopersicum (Tomato) Fruit Oil
Torreya Nucifera Seed Oil [Kaya]
Vaccinium Myrtillus Seed Oil [Bilberry]
Vaccinium Vitis-Idaea Seed Oil [Ligonberry]
Vegetable (Olus) Oil (CAS No. 68956-68-3)

* Fatty acid composition data for these ingredients have been received since the Insufficient Data Announcement was made and have been incorporated into this report. See Table 4.

FIGURES AND TABLES



-OCR, -OCR', and -OCR" may be the same or different fatty acid radicals.

Figure 1. General structure of fats and oils.[4]

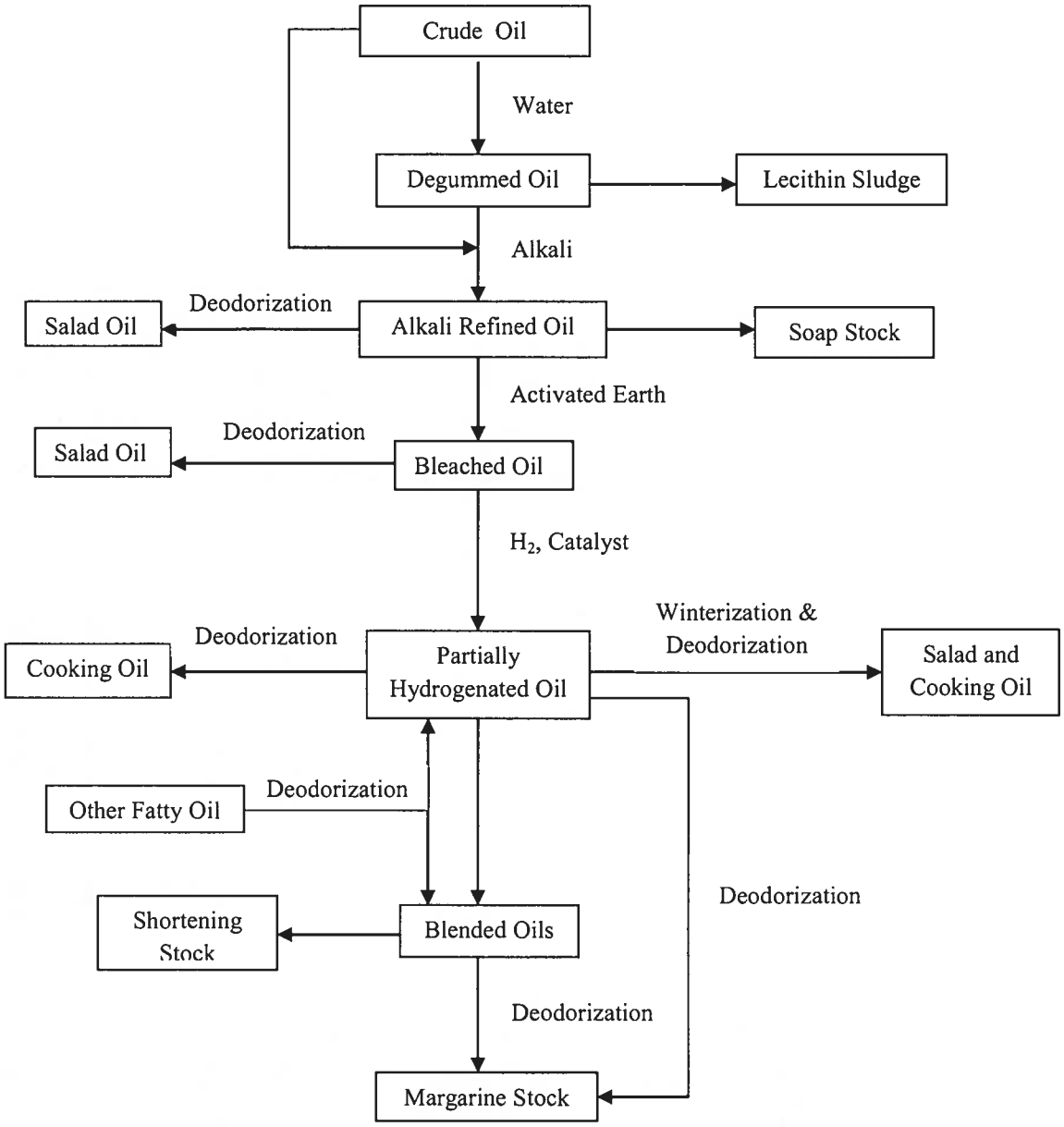


Figure 2. Basic oil refinement flowchart.[6]

Table 1. Plant-derived edible oils and their derivatives.[a]

Actinidia Chinensis (Kiwi) Seed Oil
Adansonia Digitata Oil [Baobab]
  Adansonia Digitata Seed Oil
  Hydrogenated Adansonia Digitata Seed Oil
Aleurities Moluccana Seed Oil [Kukui] (CAS No. 8015-80-3)
  Hydrogenated Kukui Nut Oil
  Aleurites Moluccanus Bakoly Seed Oil
Amaranthus Hypochondriacus Seed Oil [Amaranth]
Anacardium Occidentale (Cashew) Seed Oil (CAS No. 8007-24-7)
Arachis Hypogaea (Peanut) Oil (CAS No. 8002-03-7)
  Hydrogenated Peanut Oil (CAS No. 68425-36-5)
  Potassium Peanutate
  Sodium Peanutate
  Peanut Acid (CAS No. 91051-35-3)
Arctium Lappa Seed Oil [Burdock]
Argania Spinosa Kernel Oil [Argan]
  Hydrogenated Argania Spinosa Kernel Oil
Astrocaryum Murumuru Seed Butter [Murumuru]
  Sodium Astrocaryum Murumuruate
Avena Sativa (Oat) Kernel Oil
Bassia Butyracea Seed Butter
Bassia Latifolia Seed Butter [Mahwa]
Bertholletia Excelsa Seed Oil [Brazil]
Borago Officinalis Seed Oil [Borage] (CAS No. 225234-12-8)
Brassica Campestris (Rapeseed) Seed Oil
  Brassica Campestris (Rapeseed) Oil Unsaponifiables
  Hydrogenated Rapeseed Oil
  Rapeseed Acid
  Potassium Rapeseedate
  Sodium Rapeseedate
Brassica Napus Seed Oil [Rapeseed]
Brassica Oleracea Acephala Seed Oil [Kale]
Brassica Oleracea Italica (Broccoli) Seed Oil
Butyrospermum Parkii (Shea) Oil
  Butyrospermum Parkii (Shea) Butter (CAS No. 68920-03-6;194043-92-0)
  Butyrospermum Parkii (Shea) Butter Unsaponifiables
    (CAS No. 194043-92-0; 225234-14-0)
  Hydrogenated Shea Butter
Camelina Sativa Seed Oil [False Flax]
  Hydrogenated Camelina Sativa Seed Oil
Camellia Japonica Seed Oil
Camellia Kissi Seed Oil [Tea]
Camellia Oleifera Seed Oil [Tea Seed]
  Hydrogenated Camellia Oleifera Seed Oil
Camellia Sinensis Seed Oil
Canarium Indicum Seed Oil [Galip]
Canola Oil
  Canola Oil Unsaponifiables
  Hydrogenated Canola Oil
Carica Papaya Seed Oil [Papaya]
Carthamus Tinctorius (Safflower) Seed Oil
  Hydrogenated Safflower Seed Oil
  Potassium Safflowerate
  Sodium Safflowerate
  Safflower Acid
Carya Illinoensis (Pecan) Seed Oil
Caryocar Brasiliense Fruit Oil [Pequi]
Chenopodium Quinoa Seed Oil [Quinoa]
Citrullus Lanatus (Watermelon) Seed Oil
Citrus Aurantifolia (Lime) Seed Oil
  Citrus Aurantifolia (Lime) Seed Oil Unsaponifiables
  Hydrogenated Lime Seed Oil
  Hydrogenated Lime Seed Oil Unsaponifiables
Citrus Aurantium Dulcis (Orange) Seed Oil
  Citrus Aurantium Dulcis (Orange) Seed Oil Unsaponifiables
  Hydrogenated Orange Seed Oil
  Hydrogenated Orange Seed Oil Unsaponifiables
Citrus Grandis (Grapefruit) Seed Oil
  Citrus Grandis (Grapefruit) Seed Oil Unsaponifiables
  Hydrogenated Grapefruit Seed Oil
  Hydrogenated Grapefruit Seed Oil Unsaponifiables
Citrus Paradisi (Grapefruit) Seed Oil
Citrus Limon (Lemon) Seed Oil (CAS No. 85085-28-5)
Cocos Nucifera (Coconut) Oil (CAS No. 8001-31-8)
  Hydrogenated Coconut Oil (CAS No. 84836-98-6)
  Cocos Nucifera (Coconut) Seed Butter
  Magnesium Cocoate
  Potassium Cocoate (CAS No. 61789-30-8)
  Potassium Hydrogenated Cocoate
  Sodium Cocoate (CAS No. 61789-31-9)
  Sodium Hydrogenated Cocoate
  Coconut Acid (CAS No. 61788-47-4)
  Hydrogenated Coconut Acid (CAS No. 68938-15-8)
Coix Lacryma-Jobi (Job's Tears) Seed Oil
Corylus Americana (Hazel) Seed Oil
  Hydrogenated Hazelnut Oil
Corylus Avellana (Hazel) Seed Oil
Crambe Abyssinica Seed Oil [Abyssinian Mustard]
Cucumis Sativus (Cucumber) Seed Oil (CAS No. 70955-25-8)
Cucurbita Pepo (Pumpkin) Seed Oil (CAS No. 8016-49-7)
  Hydrogenated Pumpkin Seed Oil
Cynara Cardunculus Seed Oil [Artichoke] (CAS No. 923029-60-1)
Elaeis Guineensis (Palm) Oil (CAS No. 8002-75-3)
  Elaeis Guineensis (Palm) Kernel Oil (CAS No. 8023-79-8)
  Hydrogenated Palm Kernel Oil (CAS No. 68990-82-9; 84540-04-5)
  Elaeis (Palm) Oil
  Hydrogenated Palm Oil (CAS No. 8033-29-2; 68514-74-9)
  Elaeis Guineensis (Palm) Butter (CAS No. 8002-75-3)
  Palm Kernel Acid
  Potassium Palm Kernelate
  Potassium Palmate
  Potassium Hydrogenated Palmate
  Sodium Palm Kernelate (CAS No. 61789-89-7)
  Sodium Palmate (CAS No. 61790-79-2)
  Sodium Hydrogenated Palmate
  Palm Acid
  Hydrogenated Palm Acid
Elaeis Oleifera Kernel Oil
Euterpe Oleracea Fruit Oil [Acai]
Fragaria Ananassa (Strawberry) Seed Oil
Fragaria Chiloensis (Strawberry) Seed Oil
Fragaria Vesca (Strawberry) Seed Oil
Fragaria Virginiana (Strawberry) Seed Oil
Garcinia Indica Seed Butter [Kokum]
Gevuina Avellana Oil [Chilean Hazel]
  Gevuina Avellana Seed Oil
Glycine Soja (Soybean) Oil (CAS No. 8001-22-7)
  Glycine Soja (Soybean) Oil Unsaponifiables (CAS No. 91770-67-1)
  Hydrogenated Soybean Oil (CAS No. 8016-70-4)
  Soy Acid (CAS No. 68308-53-2)
  Potassium Soyate
  Sodium Soyate
Gossypium Herbaceum (Cotton) Seed Oil (CAS No. 8001-29-4)
  Hydrogenated Cottonseed Oil (CAS No. 68334-00-9)
  Cottonseed Acid (CAS No. 68308-51-0)
Guizotia Abyssinica Seed Oil [Ramtil/Niger]
Helianthus Annuus (Sunflower) Seed Oil (CAS No. 8001-21-6)
  Helianthus Annuus (Sunflower) Seed Oil Unsaponifiables
  Hydrogenated Sunflower Seed Oil
  Sunflower Seed Acid (CAS No. 84625-38-7)
Hippophae Rhamnoides Oil [Sea-Buckthorn]
  Hippophae Rhamnoides Fruit Oil [Sea-Buckthorn]
  Hippophae Rhamnoides Seed Oil [Sea-Buckthorn]
Irvingia Gabonensis Kernel Butter [Dika] (CAS No. 192230-28-7)

[a] Previously reviewed ingredients are in ***bold and italics***.

Table 1. Plant-derived edible oils and their derivatives (continued).[a]

Juglans Regia (Walnut) Seed Oil (CAS No. 8024-09-7)
Limnanthes Alba (Meadowfoam) Seed Oil (CAS No. 153065-40-8)
Hydrogenated Meadowfoam Seed Oil
Linum Usitatissimum (Linseed) Seed Oil (CAS No. 8001-26-1)
Linseed Acid (CAS No. 68424-45-3)
Luffa Cylindrica Seed Oil [Luffa]
Lupinus Albus Seed Oil [White Lupine]
Lupinus Albus Oil Unsaponifiables
Lycium Barbarum Seed Oil [Goji Berry]
Macadamia Integrifolia Seed Oil
Hydrogenated Macadamia Seed Oil
Macadamia Ternifolia Seed Oil (CAS No. 128497-20-1 or 129811-19-4)
Sodium Macadamiaseedate
Mangifera Indica (Mango) Seed Oil
Mangifera Indica (Mango) Seed Butter
Sodium Mangoseedate
Morinda Citrifolia Seed Oil [Noni]
Moringa Oleifera Seed Oil [Ben/Moringa]
Moringa Pterygosperma Seed Oil
Oenothera Biennis (Evening Primrose) Oil
Hydrogenated Evening Primrose Oil
Olea Europea (Olive) Fruit Oil (CAS No. 8001-25-0)
Olea Europaea (Olive) Oil Unsaponifiables (CAS No. 156798-12-8)
Hydrogenated Olive Oil
Hydrogenated Olive Oil Unsaponifiables
Potassium Olivate (CAS No. 68154-77-8)
Sodium Olivate (CAS No. 64789-88-6)
Olea Europaea (Olive) Husk Oil
Olive Acid (CAS No. 92044-96-7)
Orbignya Cohune Seed Oil [Cohune]
Orbignya Oleifera Seed Oil [Babassu] (CAS No. 91078-92-1)
Potassium Babassuate
Sodium Babassuate
Babassu Acid
Orbignya Speciosa Kernel Oil
Oryza Sativa (Rice) Bran Oil (CAS No. 68553-81-1; 84696-37-7)
Hydrogenated Rice Bran Oil
Oryza Sativa (Rice) Germ Oil
Oryza Sativa (Rice) Seed Oil
Rice Bran Acid (CAS No. 93165-33-4)
Passiflora Edulis Seed Oil [Passion Fruit] (CAS No. 87676-26-1)
Hydrogenated Passiflora Edulis Seed Oil
Perilla Ocymoides Seed Oil [Perilla]
Persea Gratissima (Avocado) Oil (CAS No. 8024-32-6)
Persea Gratissima (Avocado) Oil Unsaponifiables (CAS No. 91770-40-0)
Hydrogenated Avocado Oil
Persea Gratissima (Avocado) Butter
Sodium Avocadoate
Pistacia Vera Seed Oil [Pistachio] (CAS No. 90082-81-8; 129871-01-8)
Hydrogenated Pistachio Seed Oil
Plukenetia Volubilis Seed Oil [Sacha Inchi]
Prunus Amygdalus Dulcis (Sweet Almond) Oil (CAS No. 8007-69-0; 90320-37-9)
Prunus Amygdalus Dulcis (Sweet Almond) Oil Unsaponifiables
Hydrogenated Sweet Almond Oil
Hydrogenated Sweet Almond Oil Unsaponifiables
Sodium Sweet Almondate
Prunus Armeniaca (Apricot) Kernel Oil (CAS No. 72869-69-3)
Prunus Armeniaca (Apricot) Kernel Oil Unsaponifiables
Hydrogenated Apricot Kernel Oil
Hydrogenated Apricot Kernel Oil Unsaponifiables
Prunus Avium (Sweet Cherry) Seed Oil
Prunus Domestica Seed Oil [Prune/Plum]
Prunus Persica (Peach) Kernel Oil (CAS No. 8002-78-6; 8023-98-1)
Hydrogenated Peach Kernel Oil
Punica Granatum Seed Oil [Pomegranate]
Hydrogenated Punica Granatum Seed Oil
Pyrus Malus (Apple) Seed Oil
Ribes Nigrum (Black Currant) Seed Oil (CAS No. 97676-19-2)
Hydrogenated Black Currant Seed Oil
Ribes Rubrum (Currant) Seed Oil
Rosa Canina Fruit Oil [Dog Rose]
Hydrogenated Rosa Canina Fruit Oil
Rubus Chamaemorus Seed Oil [Cloudberry]
Rubus Idaeus (Raspberry) Seed Oil
Hydrogenated Raspberry Seed Oil
Schinziophyton Rautanenii Kernel Oil [Mongongo]
Sclerocarya Birrea Seed Oil [Marula]
Sesamum Indicum (Sesame) Seed Oil (CAS No. 8008-74-0)
Sesamum Indicum (Sesame) Oil Unsaponifiables
Hydrogenated Sesame Seed Oil
Sesamum Indicum (Sesame) Seed Butter
Sodium Sesameseedate
Silybum Marianum Seed Oil [Thistle]
Solanum Lycopersicum (Tomato) Fruit Oil
Solanum Lycopersicum (Tomato) Seed Oil
Theobroma Cacao (Cocoa) Seed Butter (CAS No. 8002-31-1)
Sodium Cocoa Butterate
Theobroma Grandiflorum Seed Butter [Cupuacu] (CAS No. 394236-97-6)
Sodium Theobroma Grandiflorum Seedate
Torreya Nucifera Seed Oil [Kaya]
Triticum Vulgare (Wheat) Germ Oil (CAS No. 8006-95-9; 68917-73-7)
Triticum Aestivum (Wheat) Germ Oil
Triticum Vulgare (Wheat) Germ Oil Unsaponifiables
Hydrogenated Wheat Germ Oil Unsaponifiables
Hydrogenated Wheat Germ Oil
Wheat Germ Acid (CAS No. 68938-32-9)
Vaccinium Corymbosum (Blueberry) Seed Oil
Vaccinium Macrocarpon (Cranberry) Seed Oil
Hydrogenated Cranberry Seed Oil
Vaccinium Myrtillus Seed Oil [Bilberry] (CAS No. 1161921-09-0)
Vaccinium Vitis-Idaea Seed Oil [Ligonberry],
Vegetable (Olus) Oil
Hydrogenated Vegetable Oil
Vitis Vinifera (Grape) Seed Oil (CAS No. 8024-22-4)
Hydrogenated Grapeseed Oil
Sodium Grapeseedate
Zea Mays (Corn) Oil (CAS No. 8001-30-7)
Zea Mays (Corn) Oil Unsaponifiables
Zea Mays (Corn) Germ Oil
Potassium Cornate (CAS No. 61789-23-9)
Corn Acid (CAS No. 68308-50-9)

Table 2. Previously reviewed oil and fatty acid ingredients.

Ingredients	Publication Date	Conclusion
Oil Ingredients		
Arachis Hypogaea (Peanut) Oil (CAS No. 8002-03-7) Hydrogenated Peanut Oil (CAS No. 68425-36-5) Peanut Acid (CAS No. 91051-35-3)	IJT 20(S2):65-77, 2001	Safe
Carthamus Tinctorius (Safflower) Seed Oil (CAS No. 8001-23-8)	JACT 4(5):171-197, 1985; Re-reviewed, not reopened IJT 25(2):1-89, 2006	Safe
Cocos Nucifera (Coconut) Oil (CAS No. 8001-31-8) Coconut Acid (CAS No. 61788-47-4) Hydrogenated Coconut Acid (CAS No. 68938-15-8) Hydrogenated Coconut Oil (CAS No. 84836-98-6) Magnesium Cocoate Potassium Cocoate (CAS No. 61789-30-8) Potassium Hydrogenated Cocoate Sodium Cocoate (CAS No. 61789-31-9) Sodium Hydrogenated Cocoate	JACT 5(3):103-121, 1986; CIR Final Report, 2008	Safe
Corylus Americana (Hazel) Seed Oil Corylus Avellana (Hazel) Seed Oil	IJT 20 (S1):15-20, 2001	Insufficient data
Elaeis Guineensis (Palm) Oil (CAS No. 8002-75-3) Elaeis Guineensis (Palm) Kernel Oil (CAS No. 8023-79-8) Hydrogenated Palm Oil (CAS No. 8033-29-2; 68514-74-9) Hydrogenated Palm Kernel Oil (CAS No. 68990-82-9; 84540-04-5)	IJT 19(S2):7-28, 2000	Safe
Gossypium Herbaceum (Cotton) Seed Oil (CAS No. 8001-29-4) Cottonseed Acid (CAS No. 68308-51-0) Hydrogenated Cottonseed Oil (CAS No. 68334-00-9)	IJT 20(S2):21-29, 2001	Safe
Oryza Sativa (Rice) Bran Oil (CAS No. 68553-81-1; 84696-37-7) Oryza Sativa (Rice) Germ Oil Rice Bran Acid (CAS No. 93165-33-4)	IJT 25(S2):91-120, 2006	Safe
Prunus Amygdalus Dulcis (Sweet Almond) Oil (CAS No. 8007-69-0)	JACT 2(5):85-99, 1983; Re-reviewed, not reopened IJT 24 (S1):1-102, 2005	Safe
Sesamum Indicum (Sesame) Seed Oil (CAS No. 8008-74-0) Hydrogenated Sesame Seed Oil Sesamum Indicum (Sesame) Oil Unsaponifiables Sodium Sesameseedate	JACT 12(3):261-277, 1993; Amended Final Report, 2009	Safe
Zea Mays (Corn) Oil (CAS No. 8001-30-7) Zea Mays (Corn) Germ Oil Zea Mays (Corn) Oil Unsaponifiables Corn Acid (CAS No. 68308-50-9) Potassium Cornate (CAS No. 61789-23-9)	Final Report, 2008	Safe
Persea Gratissima (Avocado) Oil (CAS No. 8024-32-6)	JEPT 4(4):93-103, 1980; Re-reviewed, not reopened IJT 22(1):1-35, 2003	Safe
Triticum Vulgare (Wheat) Germ Oil (CAS No. 8006-95-9; 68917-73-7)	JEPT 4(4):33-45, 1980; Re-reviewed, not reopened IJT 22(1):1-35, 2003	Safe
Fatty Acids		
Arachidonic Acid (CAS No. 506-32-1)	JACT 12 (5):481-559, 1993	Insufficient data
Hydroxystearic Acid (CAS No. 106-14-9)	IJT 18(S1):1-10, 1999	Safe
Lauric Acid (CAS No. 143-07-7) Myristic Acid (CAS No. 544-63-8) Oleic Acid (CAS No. 112-80-1) Palmitic Acid (CAS No. 57-10-3) Stearic Acid (CAS No. 57-11-4)	JACT 6(3):321-401, 1987; Re-reviewed, not reopened IJT 25(2):1-89, 2006	Safe

Table 2. Previously reviewed oil and fatty acid ingredients (continued).

Ingredients	Publication Date	Conclusion
Glyceryl Triesters		
Trilaurin		
Triarachidin		
Tribehenin		
Tricaprin		
Tricaprylin		
Trierucin		
Triheptanoin		
Triheptylundecanoin		
Triisononanoin		
Triisopalmitin		
Triisostearin		
Trilinolein	IJT 20 (S4):61-94, 2001	Safe
Trimyristin		
Trioctanoin		
Triolein		
Tripalmitin		
Tripalmitolein		
Triricinolein		
Tristearin		
Triundecanoin		
Glyceryl Triacetyl Hydroxystearate		
Glyceryl Triacetyl Ricinoleate		
Glyceryl Stearate Diacetate		

Table 3. Chemical properties for plant-derived edible oils.[a]

Properties and Constituents	Actinidia Chinensis (Kiwi) Seed Oil[96]	Adansonia Digitata Oil[97,98]	Aleurites Molucanna Seed Oil [Kukui][99-102]	Anacardium Occidentale (Cashew) Seed Oil[103]	Arachis Hypogaea (Peanut) Oil[6,99,104-107]	Argania Spinosa Kernel Oil[108,109]	Astrocaryum Murumuru Seed Butter[6,110]
Appearance		Pale yellow	Clear yellow liquid		Light yellow	Yellow	Pale brown waxy solid at room temperature
Specific gravity			0.920-0.930 (20°C)		0.912-0.920 (20°C)	0.908-0.918 (20°C)	0.890-0.910 (25°C)
Refractive index			1.470-1.480 (20°C)		1.46-1.475 (20°C)		
Iodine value		65-95	130-175		74-107	95	15 max
Saponification value		190-210	185-210		180-208		270-350
Peroxide value (meq/kg)	44.37	5.0-10	5.0 max	0.22	0.39, 5.0 max	10.0 max	20.0 max
Melting point (°C)							25-37
Unsaponifiable matter (%)			0.3 - 1		≤1.0		
Free fatty acids (%)	1.2	2.0 max as oleic acid	0.1-4		0.2-2.08		12.56 as oleic acid
Titer (°C)					26-32		
Acid value					0.5	3-4	

Properties and Constituents	Avena Sativa (Oat) Kernel Oil[111]	Bertholletia Excelsa Seed Oil[103,112]	Borago Officinalis Seed Oil[113,114]	Brassica Campestris (Rapeseed) Seed Oil[6]	Hydrogenated Rapeseed Oil[8]	Brassica Oleracea Italica (Broccoli) Seed Oil[115]	Butyrospermum Parkii (Shea) Butter[6,99,116-119]
Appearance	Yellow		Clear, pale yellow-golden		White waxy solid	Golden	Grey, tallow-like
Specific gravity	0.914-0.932 (25°C)	1.473	0.918-0.928 (20°C)			0.910-0.918 (20°C)	0.918 (15°C)
Refractive index	1.469-1.471 (25°C)	0.914 (20°C)	1.474-1.479 (20°C)			1.465-1.475 (20°C)	1.468 (25°C)
Iodine value		74.2	130-155	81-112	4 max	90-120	45-77
Saponification value	176-186	192.4	184-194	168-192			165-190
Peroxide value (meq/kg)	0.6-1.1	0.16	10.0 max		2.0 max		5.0 max
Melting point (°C)							32-46; 28-42 (slip)
Unsaponifiable matter (%)	3.7-4.3			0.5 - 2			3-13
Free fatty acids (%)	0.1-0.3			1	2.0 max as oleic acid		1.0 max as oleic acid
Titer (°C)							49-54
Acid value			1.0 max				1.5

[a]Shading identifies previously reviewed ingredients, with gray shading for ingredients with safe and red shading for ingredients with insufficient data conclusions.

Table 3. Chemical properties for plant-derived edible oils [a] (continued).

Properties and Constituents	Butyrospermum Parkii (Shea) Oil[8]	Camellia Oleifera Seed Oil[120,121]	Carica Papaya Seed Oil[122,123]	Canola Oil[8]	Carthamus Tinctorius (Safflower) Seed Oil[8]	Carya Illinoensis (Pecan) Seed Oil[99,103,112]	Caryocar Brasiliense Fruit Oil [Pequi][124]
Appearance	Pale yellow	Clear, pale yellow or "water white"	Pale yellow	Light yelllow oil	Light yellow oil		Yellow
Specific gravity						0.924 (25∘C)	
Refractive index				1.465-1.467 (40∘C)		1.472	
Iodine value	28 - 43	80-94	65-100	110-126	135-150	100 - 105	48.65-74.80
Saponification value	185-195	188-196		178-193		190	160.15-202
Peroxide value (meq/kg)	≤ 10	10.0 max	10.0 max	10 max	10 max	0.15	0.99-5.22
Melting point (∘C)							
Unsaponifiable matter (%)	≤ 1.5	1.5 max		1.5 max	1.5 max	0.35-40	
Free fatty acids (%)	≤ 0.1 as oleic acid		0.8-3	0.05 max as oleic acid	0.1 max as oleic acid		0.98-2.85 (mg KOH/g)
Titer (∘C)							
Acid value		1.0 max					

Properties and Constituents	Citrullus Lanatus (Watermelon) Seed Oil[6,125]	Citrus Aurantifolia (Lime) Seed Oil[126,127]	Citrus Aurantium Dulcis (Orange) Seed Oil[128,129]	Citrus Paradisi (Grapefruit) Seed Oil[130,131]	Cocos Nucifera (Coconut) Oil[6,8,132]	Cucurbita Pepo (Pumpkin) Seed Oil[133,134]	Elaeis Guineensis (Palm) Oil[6,8]
Appearance	Pale to golden yellow liquid	Clear yellow	Clear, light yellow	Clear yellow	White to light yellow-tan	Dark green	Pale yellow to deep orange in color
Specific gravity	0.8930-0.9166		0.910-0.920 (20∘C)		0.917 - 0.919 (25∘/15.5∘C)		0.921-0.925 (40∘C)
Refractive index	1.4668		1.466-1.475 (20∘C)		1.448 - 1.450 (40∘C)		1.453-1.458 (40∘C)
Iodine value	113-123		90-110	80-125	6-11	110-330	44-58
Saponification value	193-195		185-200		248-265	174-197	195-205
Peroxide value (meq/kg)	≤ 5.0	5.0 max	5-10	5-10	≤ 10	5.0 max	10 max
Melting point (∘C)					22 - 26		25-50
Unsaponifiable matter (%)					≤ 0.5	1.5	0.2-0.8
Free fatty acids (%)	< 5.0 as oleic acid		0.5 as oleic acid		≤ 0.1% as oleic acid; ≤ 0.07% as lauric acid	1.5 as oleic acid	0.1 max as oleic acid; 0.09 as palmitic acid
Titer (∘C)					20 - 24		
Acid value		1.0 max	0.8 max	1.0 max			

Table 3. Chemical properties for plant-derived edible oils[a] (continued).

Properties and Constituents	Elaeis Guineensis (Palm) Kernel Oil[6,8]	Fragaria Ananassa (Strawberry) Seed Oil[6,135]	Garcinia Indica Seed Butter [Kokum][136-138]	Glycine Soja (Soybean) Oil[6,8]	Gossypium Herbaceum (Cotton) Seed Oil[6,8]	Guizotia Abyssinica Seed Oil[6]	Hazel Seed Oil[104,139,140]
Appearance	Nearly colorless	Light golden		Light amber oil	Dark red-brown oil	Pale yellow with a bluish tint	
Specific gravity		0.95				0.910-0.928	0.912-0.917 (15.5°C)
Refractive index			1.4565-1.4575 (40°C)			1.467-1.471	1.467-1.474 (20°C)
Iodine value	14-33		30-50	120.9-151.4	90-113	126-139	83-97
Saponification value	245-255		185-195		180-198	180-195	187-197
Peroxide value (meq/kg)	10 max	< 15		10 max	10 max		0.43; 10.0 max
Melting point (°C)	25-30		37-43; 27 (slip)				
Unsaponifiable matter (%)	1.5 max		1.5 max; 18-20; 32-40	0.3-0.6	1.5 max	0.5-1	
Free fatty acids (%)	0.1 max as oleic acid; 0.07 max as lauric acid		0.1-1	0.05-0.7	0.1 max as oleic acid	0.4-3	0.2 max as oleic acid
Titer (°C)							
Acid value							

Properties and Constituents	Helianthus Annuus (Sunflower) Seed Oil[6,8]	Hippophae Rhamnoides Seed Oil[141,142]	Juglans Regia (Walnut) Seed Oil[99,104,112]	Linum Usitatissimum (Linseed) Seed Oil[6]	Macadamia Nut Oil[104,112,143-145]	Mangifera Indica (Mango) Seed Oil[6]	Moringa Oleifera Seed Oil[146-148]
Appearance	Light amber oil				Pale to golden yellow	Pale yello to ivory cream color	
Specific gravity	0.894-0.899 (60°C)	0.890-0.955 (20°C)	0.917 (25°C)	0.927-0.931 (20°C)	0.911-0.918 (20°C)	0.91	0.908 (20°C); 0.8933 (24°C)
Refractive index	1.4597-1.4745 (25°C)	1.4650-1.4825 (20°C)	1.475 (25°C)	1.4786-1.4815	1.466-1.470 (20°C)	1.456	1.4566 (40°C)
Iodine value	128-144	130-200	150 - 162	170-204	62-82	32-93	66.47
Saponification value	188-194	184-210	190 - 197	189-196	190-200	190-195	164.27; 192
Peroxide value (meq/kg)	10 max	5-10 max	0.37		0.36; 10.0 max		0.45; 10.0
Melting point (°C)	0			0		34-43	18.93
Unsaponifiable matter (%)	0.3-0.5	1.0	0.5	0.5-1.5	1.5	0.8-2.9	0.58
Free fatty acids (%)	0.1 max as oleic acid	2.0 max	0.2 - 2.5	5	0.5 max; 1.0 max as oleic acid		2.55 as oleic acid
Titer (°C)							
Acid value		15			1		

Table 3. Chemical properties for plant-derived edible oils[a] (continued).

Properties and Constituents	Oenothera Biennis (Evening Primrose) Oil[149,150]	Olea Europaea (Olive) Fruit Oil[6]	Olea Europaea(Olive) Husk Oil[151]	Orbignya Oleifera Seed Oil[6]	Oryza Sativa (Rice) Bran Oil[152,153]	Passiflora Edulis Seed Oil [Passion Fruit]	Persea Gratissima (Avocado) Oil[6]
Appearance	Light yellow	Almost colorless to yellow, greenish, or brown in color			Light golden yellow	Golden-orange	
Specific gravity	0.920-0.930 (20°C)	0.914-0.918		0.916-0.918 (15°C)	0.916-0.922 (15.5°C)	0.917 (20°C)	0.910-0.916
Refractive index	1.475-1.480 (20°C)	1.469-1.484		1.449-1.451 (40°C)	1.470-1.473 (20°C)	1.468-1.473 (20°C)	1.461-1.465
Iodine value	145-165	64-88; refined 75-94		14-18	92-115	119.9-129.29[154]	71-95
Saponification value	180-195	185-212; refined 184-186		247-251	180-195	176-187.4	177-198
Peroxide value (meq/kg)	10.0 max	20 max (refined)	14.33		10.0 max	1.37-2.23	
Melting point (°C)							
Unsaponifiable matter (%)		0.6-1.2; 1.5 max refined				0.9-2.86	
Free fatty acids (%)		0.6-1.4; 0.3 max refined			1.0 as oleic acid		
Titer (°C)							
Acid value	1-2					2.11-2.36	

Properties and Constituents	Pistacia Vera Seed Oil[103]	Prunus Amygdalus (Sweet Almond) Oil[6,99,104,155-157]	Prunus Armeniaca (Apricot) Kernel Oil[6]	Prunus Avium (Sweet Cherry) Seed Oil[158,159]	Prunus Domestica Seed Oil[160,161]	Prunus Persica (Peach) Kernel Oil[6,162]	Punica Granatum Seed Oil[163,164]
Appearance		Colorless to pale yellow liquid		Clear light yellow		Pale yellow (refined)	Golden to dark yellow
Specific gravity		0.911-0.920 (20°C)	0.923	0.905-0.925 (20°C)		0.910-0.920 (20°C) refined	0.935 (15.5°C)
Refractive index		1.467-1.473 (20°C)	1.4672-1.4722	1.463-1.480 (20°C)			
Iodine value		93 - 106	81-123	90-115	90-108	90-115 (refined)	190-230
Saponification value		183 - 197	191	105-135			
Peroxide value (meq/kg)	0.22	0.19		10.0 max	10.0 max	5.0 max (refined)	10.0 max
Melting point (°C)							
Unsaponifiable matter (%)		0.4-1.0					
Free fatty acids (%)		1.0 max		0.5% max	2.0 max as oleic acid		1.4; 5.0 max as oleic acid
Titer (°C)							
Acid value		0.5		1.0 max			

Table 3. Chemical properties for plant-derived edible oils[a] (continued).

Properties and Constituents	Pyrus Malus (Apple) Seed Oil[165]	Ribes Nigrum (Black Currant) Seed Oil[166,167]	Rubus Idaeus (Raspberry) Seed Oil[168,169]	Sclerocarya Birrea Seed Oil [Marula][170]	Solanum Lycopersicum (Tomato) Seed Oil[171]	Theobroma Cacao (Cocoa) Seed Butter[6]
Appearance					Clear golden yellow to darker red	
Specific gravity	0.902-0.903 (25◦C)				0.9135-0.9357	0.950-0.998
Refractive index	1.465-1.466 (40◦C)			1.46	1.4577-1.4771	1.453-1.458
Iodine value	94.14-101.15	145-185	175-195	100.25	105-130.5	35-40
Saponification value	179.01-197.25		180-200	162.70	156-194.9	190-200
Peroxide value (meq/kg)	2.43-2.52	1-10	5.0 max	4.58		
Melting point (◦C)				26-28		33.5
Unsaponifiable matter (%)				3.06		
Free fatty acids (%)		0.2	1.5 max as oleic acid			
Titer (◦C)						
Acid value	4.036-4.323	3		33.70		

Properties and Constituents	Vaccinium Corymbosum (Blueberry) Seed Oil[96,172,173]	Vaccinium Macrocarpon (Cranberry) Seed Oil[6,96,174-176]	Vitis Vinifera (Grape) Seed Oil[6]	Zea Mays (Corn) Oil[177,178]
Appearance	Green with yellow tint or dark green /brown	Light green		Clear, bright golden yellow
Specific gravity		0.923	0.91-0.93	0.920-0.928 (15.5◦C)
Refractive index			1.470-1.476	1.472-1.476 (20◦C)
Iodine value	155-175	140-180	125-143	103-128
Saponification value		170-200	176-206	185-195
Peroxide value (meq/kg)	20-24.62	< 15		10.0 max
Melting point (◦C)				
Unsaponifiable matter (%)				
Free fatty acids (%)	0.67; 2.0 as oleic acid	0.7; 1.0 as oleic acid		
Titer (◦C)				
Acid value		2.0 max		0.2 max

Table 4. Total fatty acid composition of plant-derived edible oils (%).[a]

Fatty Acids	Actinidia Chinensis (Kiwi) Seed Oil[96]	Adansonia Digitata Oil [Baobab][97,98]	Aleurites Molucanna Seed Oil [Kukui][99,101,102]	Amaranthus Hypochondriacus Seed Oil [Amaranth][179]	Anacardium Occidentale (Cashew) Seed Oil[103]	Arachis Hypogaea (Peanut) Oil[6,105,106]	Argania Spinosa Kernel Oil [Argan][108,109]	Astrocaryum Murumuru Seed Butter [Murumuru][110]	Avena Sativa (Oat) Kernel Oil[111,180]
Caproic (C6)									
Caprylic (C8)								1.85	
Capric (C10)								1.85	
Lauric (C12)*	0.02							47.46	
Myristic (C14)	0.03				0.07			26	0.2-0.3
Myristoleic (C14:1)									
Palmitic (C16)	5.96	18-30	5-8	19 - 20	9.9	5-16	10-15	6.28	13.9-18.82
Palmitoleic (C16:1)		1	0.5		0.4				0.1-0.4
Heptadecanoic (C17:0)					0.1				
Stearic (C18)	3.09	2-8	0.1-6.7	3	8.7	1-6.5	5-6.5	2.65	0.8-2.79
Oleic (C18:1)	14.6	30-40	10-35	22 - 26	57.2	33.3-76	45-55	12.56	31.4-51.26
Linoleic (C18:2)	17.55	24-34	35-50	46 - 50	20.8	8-47.5	28-36	2.87	22.8-43.1
Linolenic (C18:3)	57.4	1-3	24-40		0.2	0-0.6			0.64-2.1
Arachidic (C20)	0.34		1.5		1	0.17-3			
Eicosenoic (C20:1)			1		0.3	0.33-3			0.5-1
Eicosadienoic (C20:2)									
Arachidonic (C20:4)									
Behenic (C22)					0.4	1-5			
Erucic (C22:1)					0.3	0.5			
Docosadienoic (C22:2)									
Docosahexaenoic (C22:6)									
Lignoceric (C24)						0.2-3			
Others						<C16:0 = 0.4			Arachidic (C20) + Eicosadienoic (C20:2)=0.1-0.3; C18:1, n-11=0.9-1.3

Table 4. Total fatty acid composition of plant-derived edible oils (%) (continued).[a]

Fatty Acids	Bassia Butyracea Seed Butter[h136]	Bassia Latifolia Seed Butter [Mahwa][c,136]	Bertholletia Excelsa Seed Oil [Brazil][103]	Borago Officinalis Seed Oil [Borage][113,114]	Brassica Campestris (Rapeseed) Seed Oil[6]	Brassica Napus Seed Oil [Rapeseed][181]	Hydrogenated Rapeseed Oil[8]	Brassica Oleracea Italica (Broccoli) Seed Oil[115]	Butyrospermum Parkii (Shea) Oil[8]
Caproic (C6)									
Caprylic (C8)									
Capric (C10)									
Lauric (C12)									
Myristic (C14)			0.06				< 1.0		
Myristoleic (C14:1)									
Palmitic (C16)	60.8	23.7-24.7	13.5	9-13	1.5 - 3	2	3-5.0	0-5	3.8-4.1
Palmitoleic (C16:1)			0.3						
Heptadecanoic (C17:0)			0.2						
Stearic (C18)	3.2	19.3-29.9	11.8	3-5	0.7 - 1.3	1	38-42	0-5	41.2-56.8
Oleic (C18:1)	30.9	36.3-43.3	29.1	10-22	12.1 - 57.4	21	1	10-20	34.0-46.9
Linoleic (C18:2)	4.9	11.6-15.8	42.8	33-46	11.4 - 22.1	20	< 1.0	10-20	3.7-6.5
Linolenic (C18:3)			0.2	18-25	8.3 - 12.5	2		5-10	
Arachidic (C20)			0.5			1	8-10.0		1-2
Eicosenoic (C20:1)			0.2	2-6	5.6 - 3.1		< 1.0	5-10	
Eicosadienoic (C20:2)									
Arachidonic (C20:4)									
Behenic (C22)			0.1				42-50		
Erucic (C22:1)			0.3	1-3.5	1 - 58.6	53	< 1.0	40-50	
Docosadienoic (C22:2)									
Docosahexaenoic (C22:6)									
Lignoceric (C24)						2	1-2.0		
Others				α-Linolenic (C18:3) = 0.4%; γ-Linolenic = 1-3.5%					

Table 4. Total fatty acid composition of plant-derived edible oils (%) (continued).[a]

Fatty Acids	Butyrospermum Parkii (Shea) Butter[6,116-118]	Camelina Sativa Seed Oil [False Flax][182]	Camellia Japonica Seed Oil[183]	Camellia Kissi Seed Oil[183]	Camellia Oleifera Seed Oil [Tea Seed][120,121]	Camellia Sinensis Seed Oil[183]	Canola Oil[8]	Carica Papaya Seed Oil [Papaya][122,123]	Carthamus Tintorius (Safflower) Seed Oil[32,184]
Caproic (C6)									
Caprylic (C8)									
Capric (C10)									
Lauric (C12)									
Myristic (C14)	0.5						< 0.2		
Myristoleic (C14:1)									
Palmitic (C16)	3-9	7.8	7.9		6.1-15	8-10	< 6.0	8-18	2
Palmitoleic (C16:1)			0.16				< 1.0	2	
Heptadecanoic (C17:0)									
Stearic (C18)	30-50	2.96	2.46		0.8-2	1.5-3.5	< 2.5	2-6	
Oleic (C18:1)	38-50	16.77	84.99	80	72-87	78-86	> 50	60-77	26
Linoleic (C18:2)	3-8	23.08	3.76		5.3-14.3	7-10	< 40.0	3-25	68
Linolenic (C18:3)	0.5 max	31.2				0.2-0.8	< 14	0.8	Trace
Arachidic (C20)	2.5-3		0.49				< 1.0		Trace
Eicosenoic (C20:1)		11.99					< 2.0	2	
Eicosadienoic (C20:2)									
Arachidonic (C20:4)									
Behenic (C22)							< 0.5		
Erucic (C22:1)		2.8					< 2.0		
Docosadienoic (C22:2)									
Docosahexaenoic (C22:6)									
Lignoceric (C24)							< 0.2		
Others		3.4					< C14 = < 0.1; C24:1 = < 0.2	α-Linolenic (C18:3) = 2%;	

Table 4. Total fatty acid composition of plant-derived edible oils (%) (continued).[a]

Fatty Acids	Carya Illinoensis (Pecan) Seed Oil[99,103]	Caryocar Brasiliense Fruit Oil [Pequi][f,124]	Chenopodium Quinoa Seed Oil [Quinoa][185]	Citrullus Lanatas (Watermelon) Seed Oil[125]	Citrus Aurantifolia (Lime) Seed Oil[126,127]	Citrus Aurantium Dulcis (Orange) Seed Oil[128,129]	Citrus Grandis (Grapefruit) Seed Oil[130,131]	Citrus Limon (Lemon) Seed Oil[186]	Cocos Nucifiera (Coconut) Oil[33]
Caproic (C6)									0-1
Caprylic (C8)									5-9
Capric (C10)									6-10
Lauric (C12)							1.5		44-52
Myristic (C14)	Trace		0.2		1		1		13-19
Myristoleic (C14:1)									
Palmitic (C16)	3-4.3	34.4-43.61	9.9 - 11	8.0 - 13.0	20-30	14-22	18-30	18.8	8-11
Palmitoleic (C16:1)	0.1		0.1	< 1.0					0-1
Heptadecanoic (C17:0)	0.1							0.08	
Stearic (C18)	1.8-2	0.66-1.8	0.7 - 0.8	8.0 - 12.0	3-8	2-6	2-8	3.5	1-3
Oleic (C18:1)	40.6-79	54.55-57.4	22 - 24.5	15.0 - 30.0	20-38	26-35	20-38	30.1	5-8
Linoleic (C18:2)	16-50.3	0.84-2.8	50.2 - 56	55.0 - 65.0	30-45	35-45	30-48	33.4	Trace-2.5
Linolenic (C18:3)	0.7	0.18-1.0	5.4 - 7	< 1.0	5-15	2-6	2-6	13.5	
Arachidic (C20)	Trace		0.7	< 1.0	2	0.5		0.3	
Eicosenoic (C20:1)	1.2			< 1.0				0.03	
Eicosadienoic (C20:2)									
Arachidonic (C20:4)									
Behenic (C22)	0.2			< 1.0				0.08	
Erucic (C22:1)	0.3								
Docosadienoic (C22:2)									
Docosahexaenoic (C22:6)				< 2.0					
Lignoceric (C24)								0.2	
Others				< 1.0				C23:0 = <0.01; C26:0 = 0.01	

Table 4. Total fatty acid composition of plant-derived edible oils (%) (continued).[a]

Fatty Acids	Corylus Americana (Hazel) Seed Oil[181]	Corylus Avellana (Hazel) Seed Oil[12,139,140]	Crambe Abyssinica Seed Oil [Abyssinian Mustard][181]	Cucumis Sativus (Cucumber) Seed Oil[187]	Cucurbita Pepo (Pumpkin) Seed Oil[133,134]	Cynara Cardunculus Seed Oil [Artichoke][188]	Elaeis Guineensis (Palm) Oil[26]	Elaeis Guineensis (Palm) Kernel Oil[26]	Elaeis Oleifera Kernel Oil[189]
Caproic (C6)								0.3	0.1
Caprylic (C8)								4.4	0.9
Capric (C10)								3.7	0.8
Lauric (C12)							0.2	48.3	29.3
Myristic (C14)		0.03-0.04					1.1	15.6	25.7
Myristoleic (C14:1)									
Palmitic (C16)	6	4.96-9	2	9-13	10-16	12	44	7.8	10.1
Palmitoleic (C16:1)		0.2-1					0.1		
Heptadecanoic (C17:0)		0.04-0.05							
Stearic (C18)	3	1-6		6-9	3-7	3	4.5	2	1.8
Oleic (C18:1)	76	66-85	15	14-20	18-38	25	39.2	15.1	26.4
Linoleic (C18:2)	15	7-25	10	60-68	40-62	60	10.1	2.7	4.5
Linolenic (C18:3)		0.2-0.6	7	<1	1		0.4		
Arachidic (C20)		0.1					0.4		
Eicosenoic (C20:1)		0.1-0.2	6						
Eicosadienoic (C20:2)									
Arachidonic (C20:4)									
Behenic (C22)		0.02							
Erucic (C22:1)		0.01	60						
Docosadienoic (C22:2)									
Docosahexaenoic (C22:6)									
Lignoceric (C24)		0.01							
Others								0.2	0.4

Table 4. Total fatty acid composition of plant-derived edible oils (%) (continued).[a]

Fatty Acids	Euterpe Oleracea Fruit Oil [Acai][190]	Fragaria Ananassa (Strawberry) Seed Oil[96,135]	Garcinia Indica Seed Butter [Kokum][g,136,137]	Gevuina Avellana Oil [Chilean Hazel][j,191]	Glycine Soja (Soybean) Oil[6]	Gossypium Herbacceum (Cotton) Seed Oil[27]	Guizotia Abyssinica Seed Oil [Ramtil/Niger][6]	Helianthus Annuus (Sunflower) Seed Oil[6]	Hippophae Rhamnoides Fruit Oil[i,192]
Caproic (C6)									
Caprylic (C8)									
Capric (C10)									
Lauric (C12)									
Myristic (C14)		0.05				2			0.4-0.6
Myristoleic (C14:1)									0.2
Palmitic (C16)	22	4.32	2-8	1.9		21	5.0-13	5.0 - 7.2	33.4-37.8
Palmitoleic (C16:1)	2			22.7					24.9-26.1
Heptadecanoic (C17:0)									
Stearic (C18)	2	1.68	50-67.4	0.5		Trace	2.0-11	2.0 - 6.5	0.9-2.1
Oleic (C18:1)	60	14.55 - 19.5	27-42	39.4	11.5 - 60.0	30	6.0-40	14.7 - 37.2	22.3-26.2
Linoleic (C18:2)	12	28.5 – 42.22	0.5-2	5.6	25 - 63.1	45	45-77	51.5 - 73.5	
Linolenic (C18:3)	Trace	33.5 - 36.5		0.1	2.9 - 12.1			Trace - 0.3	1.7-6.8
Arachidic (C20)	2.5	0.71	0.7	1.4		Trace		0.3 - 1	
Eicosenoic (C20:1)				3.1					
Eicosadienoic (C20:2)									
Arachidonic (C20:4)									
Behenic (C22)				2.2					
Erucic (C22:1)									
Docosadienoic (C22:2)									
Docosahexaenoic (C22:6)									
Lignoceric (C24)				0.5			2 max		
				C18:1Δ12 = 6.2; C20:1Δ15 = 6.6; ; C22:1Δ17 = 7.9; ; C22:1Δ19 =					Vakccenic C18:1(n-7) = 7.3-7.5; α-Linoleic C18:2 = 4.1-5.5
Others		5.5 - 8.5		1.6					

Table 4. Total fatty acid composition of plant-derived edible oils (%) (continued).[a]

Fatty Acids	Hippophae Rhamnoides Seed Oil[142,192]	Juglans Regia (Walnut) Seed Oil[193]	Limnanthes Alba (Meadowfoam) Seed Oil[6]	Linum Usitastissimum (Linseed) Seed Oil[6]	Macadamia Integrifolia Seed Oil[b,2,143-145]	Mangifera Indica (Mango) Seed Oil[c,6]	Moringa Oleifera Seed Oil [Ben/Moringa][14,6,147,194]	Oenothera Biennis (Evening Primrose) Oil[149,150]	Olea Europea (Olive) Oil[6]
Caproic (C6)									
Caprylic (C8)									
Capric (C10)									
Lauric (C12)					0.1-1.4				
Myristic (C14)					0.7-1.5		Trace		Trace
Myristoleic (C14:1)									
Palmitic (C16)	5-11.3	3-7		5.5	6-12	5-8	5-9.3	4-10	7.5 - 20
Palmitoleic (C16:1)	4.4				12-25		1.5-3		0.3 - 3.5
Heptadecanoic (C17:0)									
Stearic (C18)	2-5	0.5-3		3.5	0.5-8	33-48	3-8	2-4	0.5 - 3.5
Oleic (C18:1)	18-30	9-30		19.1	50-67	35-50	65-80	5-12	53 - 86
Linoleic (C18:2)	28-40	57-76		15.3	1.5-5	4.0-8	1.5-5	60-85	3.5 - 20
Linolenic (C18:3)	24.9-35	2-16		57	0.5-1.9		1-1.5		0 - 1.5
Arachidic (C20)					1.5-5	1-7	2-5		Trace
Eicosenoic (C20:1)			52 - 77		1.5-3.1		2.5-4		
Eicosadienoic (C20:2)									
Arachidonic (C20:4)									
Behenic (C22)					0.3-1		8-8.6		Trace
Erucic (C22:1)			8.0 - 29		1		3		
Docosadienoic (C22:2)			7.0 - 20						
Docosahexaenoic (C22:6)									
Lignoceric (C24)							Trace		Trace
Others	Vakccenic C18:1(n-7) = 3.2; α-Linoleic C18:2 = 34.1; Others = 3 max							α-Linolenic (C18:3) = 1% γ-Linolenic = 7-12%	

Table 4. Total fatty acid composition of plant-derived edible oils (%) (continued).[a]

Fatty Acids	Olea Europea (Olive) Husk Oil[151]	Orbignya Cohune Seed Oil [Cohune][6]	Orbignya Oleifera Seed Oil [Babassu][6]	Oryza Sativa (Rice) Bran Oil[153]	Oryza Sativa (Rice) Germ Oil[28]	Passiflora Edulis Seed Oil [Passion Fruit][154]	Perilla Ocymoides Seed Oil [Perilla][6]	Persea Gratissima (Avocado) Oil[6]	Pistacia Vera Seed Oil [Pistachio][103]
Caproic (C6)									
Caprylic (C8)		7.5	4 to 8						
Capric (C10)		6.5	4 to 8						
Lauric (C12)		46.5	44 - 47						
Myristic (C14)		16	15 - 20		6.92	0.03			0.09
Myristoleic (C14:1)									
Palmitic (C16)	14.96	9.5	6 to 9	14	9.28	8.57		13-17	7.4
Palmitoleic (C16:1)	2.18				4.41	0.23		3 - 5.1	0.7
Heptadecanoic (C17:0)									
Stearic (C18)	1	3	3 to 5	2	7.91	1.66			0.9
Oleic (C18:1)	64.08	10	10 to 12	45	17.81	16.25	14-23	67-72	58.2
Linoleic (C18:2)	16.09	1	1 to 3	34	16.22	72.69	16	10 to 12	30.3
Linolenic (C18:3)	0.71			1	15.56	0.26	63-70		0.4
Arachidic (C20)					3.08				0.6
Eicosenoic (C20:1)									0.6
Eicosadienoic (C20:2)									
Arachidonic (C20:4)					5.48				
Behenic (C22)									0.3
Erucic (C22:1)									0.6
Docosadienoic (C22:2)									
Docosahexaenoic (C22:6)									
Lignoceric (C24)									
Others					Arachidontrienoic = 5.21	Unspecified other fatty acids = 0.31			

Table 4. Total fatty acid composition of plant-derived edible oils (%) (continued).[a]

Fatty Acids	Prunus Amygdalus (Sweet Almond) Oil[6,99,155-157,195]	Prunus Armeniaca (Apricot) Kernel Oil[6]	Prunus Avium (Sweet) Cherry Seed Oil[4,158,159]	Prunus Domestica Seed Oil [Prune/Plum][160,161]	Prunus Persica (Peach) Kernel Oil[162]	Punica Granatum Seed Oil [Pomegranate][163,164]	Pyrus Malus (Apple) Seed Oil[165]	Ribes Nigrum (Black Currant) Seed Oil[166,167]	Rosa Canina Seed Oil [Dog Rose][186,196]
Caproic (C6)									
Caprylic (C8)									
Capric (C10)									
Lauric (C12)									
Myristic (C14)	1								0.11-0.21
Myristoleic (C14:1)									
Palmitic (C16)	4-9	Small quantity	4-10	4-9	2.0 - 7	1-10	6.51-6.60	6-10	1.71-4.6
Palmitoleic (C16:1)	0.8			1			0-0.05		0.24-1.01
Heptadecanoic (C17:0)	0.2								0.04
Stearic (C18)	2-3		1-4	3	0.5 - 3.5	1-5	1.75-1.96	1-4	1.69-2.47
Oleic (C18:1)	62-86		23-55	60-80	55 - 70	3-12	37.49-38.55	9-16	14.71-21.7
Linoleic (C18:2)	20-30		30-55	15-25	22 - 33	2-12	50.70-51.40	40-50	47.9-54.41
Linolenic (C18:3)	0.4		13	1	≤ 1		0.19-0.30		16.42-21.8
Arachidic (C20)	0.2		2				1.49-1.54	1	1.0-2.61
Eicosenoic (C20:1)	0.3						0.51-0.56	3	0.3
Eicosadienoic (C20:2)									0.07
Arachidonic (C20:4)									
Behenic (C22)	0.2						0-0.40	1	0.1-0.64
Erucic (C22:1)	0.1							1	
Docosadienoic (C22:2)									
Docosahexaenoic (C22:6)									
Lignoceric (C24)									0.04
Others	<C16:0 = 0.1	Oleic/Linoleic = 90-93%	Eleostearic (C18:3 conj) = 10%			Punicic (C18:3conj) = 60-80; Other C18:3conj = 18%		α-Linolenic (C18:3) = 11-17% γ-Linolenic = 11-14% Stearidonic (18:4) = 2-2.5%	C17:1 = 0.01; C21:0= 0.01, C23:0 = 0.03

Table 4. Total fatty acid composition of plant-derived edible oils (%) (continued).[a]

Fatty Acids	Rubus Idaeus (Raspberry) Seed Oil[96,168,169]	Sclerocarya Birrea Seed Oil [Marula][170,197]	Sesamum Indicum (Sesame) Seed Oil[25,53]	Silybum Marianum Seed Oil [Thistle][198]	Solanum Lycopersicum (Tomato) Seed Oil[171]	Theobroma Cacao (Cocoa) Seed Butter[6]	Theobroma Grandiflorum Seed Butter [Cupuacu][199]	Triticum Vulgare (Wheat) Germ Oil[30,50]
Caproic (C6)		1.41						
Caprylic (C8)								
Capric (C10)								
Lauric (C12)					Trace-0.3			
Myristic (C14)	0.07	2.12	<0.5		1.5-2.3		Trace	
Myristoleic (C14:1)					Trace			
Palmitic (C16)	2-2.43	9-12; 22.56	7.0 - 12.0	9.4	16.9-23.4	24-29	7.2	11.0 - 16
Palmitoleic (C16:1)		0.05 - 0.15	<0.5		3.3-6.8		0.1	
Heptadecanoic (C17:0)							0.2	
Stearic (C18)	0.9-1	5-8; 50.76	3.5 - 6.0	6.6	4.0-9.5	34-36	30.8	1.0 - 6
Oleic (C18:1)	10.87-11	4.13; 70 - 78	35 - 50	21.3	18.3-29.7	30-40	43.9	8.0 - 30
Linoleic (C18:2)	52.6-53.67	4.0 - 7.0	35 - 50	53.3	37.6-42.8	2.4	4.6	44 - 65
Linolenic (C18:3)	31.68-32	0.1 - 0.6	<1.0	Trace	Trace-0.7		Trace	4.0 - 10
Arachidic (C20)	0.37	0.3 - 0.7	<1.0	3.8	0.8-1.3		11	
Eicosenoic (C20:1)		0.1 - 0.5	<0.5	0.5				
Eicosadienoic (C20:2)								
Arachidonic (C20:4)		8.46						
Behenic (C22)		5.14	<0.5	2.4	Trace-0.7			
Erucic (C22:1)		0.1 - 0.5						
Docosadienoic (C22:2)								
Docosahexaenoic (C22:6)								
Lignoceric (C24)		4.13		0.7				
Others		Butyric = 0.35%	Trace of components below C14					0 - 1.2 C20-22 Saturated acids

Table 4. Total fatty acid composition of plant-derived edible oils (%) (continued).[a]

Fatty Acids	Vaccinium Corymbosum (Blueberry) Seed Oil[96,172,173]	Vaccinium Macrocarpon (Cranberry) Seed Oil[96,174-176]	Vitis Vinifera (Grape) Seed Oil[6]	Zea Mays (Corn) Oil[51,177,178]
Caproic (C6)				
Caprylic (C8)				
Capric (C10)				
Lauric (C12)	0.02	0.14		
Myristic (C14)	0.09	0.08		0.1 - 1.7
Myristoleic (C14:1)				
Palmitic (C16)	3-8	4-6	7-9.5	8-12; 8-16.5
Palmitoleic (C16:1)				0.2 - 1.6
Heptadecanoic (C17:0)				
Stearic (C18)	0.5-3.5	1-1.25	3.5-5.5	2.5 - 4.5; 0-4
Oleic (C18:1)	15-25	20-25.3	14-44	19 – 49; 20-43
Linoleic (C18:2)	35-45	32-37.68	46-74	34 – 62; 50-66
Linolenic (C18:3)	22-38	30-35		0-2
Arachidic (C20)	0.25	0.07		1
Eicosenoic (C20:1)				1
Eicosadienoic (C20:2)				
Arachidonic (C20:4)				
Behenic (C22)				
Erucic (C22:1)				
Docosadienoic (C22:2)				
Docosahexaenoic (C22:6)				
Lignoceric (C24)				
Others		α-Linolenic (C18:3) = 34-35%		

[a] Shading identifies previously reviewed ingredients, with gray shading for ingredients with safe and red shading for ingredients with insufficient data conclusions.. [b]Macadamia integrifolia and macadamia ternifolia are synonyms, information is being reported under the more common name. [c] As Mango Kernel Fat. [d] As Cherry Kernel Oil. [e]As Bassia Latifolia Seed Fat or Madhuca Indica Seed Fat. [f]As Caryocar Brasiliense Pulp Oil. [g] As Garcinia Indica Seed Fat. [h] As Bassia Butyracea Seed Fat. [i] As Hippophae Rhamnoides Pulp Oil.

Table 5a. Frequency of use according to duration and exposure.

	No. of Uses 2010	Conc of Use (2010) (%)	No. of Uses 2010	Conc of Use (2010) (%)	No. of Uses 2010	Conc of Use (2010) (%)	No. of Uses 2010	Conc of Use (2010) (%)	No. of Uses 2010	Conc of Use (2010) (%)	No. of Uses 2010	Conc of Use (2010) (%)
	Actinidia Chinensia (Kiwi) Seed Oil		Adansonia Digitata Oil		Aleurities Moluccana Seed Oil		Anacardium Occidentale (Cashew) Seed Oil		Argania Spinosa Kernel Oil		Astrocaryum Murumuru Seed Butter	
Totals*	**7**	**0.1**	**6**	**0.01**	**141**	**0.00001-4**	**10**	**0.002-1**	**100**	**0.001-10**	**192**	**0.001-7**
Duration of Use												
Leave-On	*5*	*NR*	*4*	*0.01*	*87*	*0.00002-4*	*9*	*0.04-1*	*87*	*0.001-10*	*171*	*0.001-7*
Rinse-Off	*2*	*0.1*	*2*	*NR*	*54*	*0.00001-3*	*1*	*0.002*	*13*	*0.001-2*	*21*	*0.001-0.2*
Exposure Type												
Eye Area	NR	NR	NR	NR	6	0.0001-0.005	NR	NR	11	0.1-1	21	0.06-0.5
Possible Ingestion	1	NR	NR	0.01	1	0.01	NR	NR	9	0.1-1	22	1-7
Inhalation	1	NR	NR	NR	15	0.1	NR	NR	NR	0.01	NR	NR
Dermal Contact	5	NR	5	0.01	76	0.00001-4	9	0.002-1	88	0.001-10	178	0.001-7
Deodorant (Underarm)	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.001	NR	NR
Hair - Non-Coloring	2	0.1	1	NR	58	0.00002-0.1	1	NR	8	0.01-1	11	0.001-0.2
Hair - Coloring	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.07-0.1	3	NR
Nail	NR	NR	NR	NR	4	NR	NR	NR	2	0.001-0..1	NR	NR
Mucous Membrane	NR	NR	NR	NR	5	0.00001-0.4	NR	NR	2	0.001-2	3	NR
Bath Products	NR	NR	NR	NR	6	0.01-0.3	NR	NR	1	0.05	NR	NR
Baby Products	NR	NR	1	NR	NR	NR	NR	NR	NR	NR	NR	NR

	Sodium Astrocaryum Murumuruate		Avena Sativa (Oat) Kernel Oil		Bassia Latifolia Seed Butter		Bertholletia Excelsa Seed Oil		Borago Officinalis Seed Oil		Brassica Campestris (Rapeseed) Seed Oil	
Totals	**NR**	**0.002-0.005**	**43**	**0.01-3**	**22**	**NS**	**55**	**0.0003-0.5**	**180**	**0.001-1**	**27**	**0.007-17**
Duration of Use												
Leave-On	*NR*	*0.002*	*37*	*0.1-3*	*17*	*NS*	*18*	*0.0003-0.5*	*160*	*0.001-1*	*23*	*0.007-17*
Rinse-Off	*NR*	*0.002-0.005*	*6*	*0.001-0.1*	*5*	*NS*	*37*	*0.01-0.2*	*20*	*0.001-0.01*	*4*	*0.1-1*
Exposure Type												
Eye Area	NR	NR	NR	0.2	4	NS	1	NR	7	0.001-0.5	2	NR
Possible Ingestion	NR	NR	NR	2	NR	NS	NR	NR	NR	0.01	1	9
Inhalation	NR	NR	NR	NR	NR	NS	1	NR	3	0.1	NR	NR
Dermal Contact	NR	0.002-0.005	41	0.001-3	22	NS	29	0.0003-0.5	168	0.001-1	27	0.007-17
Deodorant (Underarm)	NR	NR	NR	NR	NR	NS	NR	NR	NR	NR	NR	NR
Hair - Non-Coloring	NR	NR	2	0.1	NR	NS	12	0.05-0.2	10	NR	NR	0.1
Hair - Coloring	NR	NR	NR	NR	NR	NS	14	NR	NR	NR	NR	NR
Nail	NR	NR	NR	NR	NR	NS	NR	NR	NR	NR	NR	NR
Mucous Membrane	NR	0.002	2	0.01-0.1	5	NS	7	0.01	4	0.001-0.01	1	NR
Bath Products	NR	NR	1	NR	NR	NS	3	NR	1	NR	NR	NR
Baby Products	NR	NR	6	0.1	NR	NS	NR	NR	3	NR	NR	NR

Table 5a. Frequency of use according to duration and exposure. (continued)

	No. of Uses 2010	Conc of Use (2010) (%)	No. of Uses 2010	Conc of Use (2010) (%)	No. of Uses 2010	Conc of Use (2010) (%)	No. of Uses 2010	Conc of Use (2010) (%)	No. of Uses 2010	Conc of Use (2010) (%)	No. of Uses 2010	Conc of Use (2010) (%)
	Hydrogenated Rapeseed Oil		Brassica Oleracea Italica (Broccoli) Seed Oil		Butyrospermum Parkii (Shea) Oil		Butyrospermum Parkii (Shea) Butter		Butyrospermum Parkii (Shea) Butter Unsaponifiables		Hydrogenated Shea Butter	
Totals	**1**	**0.3-4**	**NR**	**0.001-3**	**22**	**0.01-15**	**1950**	**0.0005-60**	**38**	**0.06-3**	**4**	**1**
Duration of Use												*1*
Leave-On	*NR*	*0.3-4*	*NR*	*3*	*16*	*0.01-15*	*1680*	*0.001-60*	*35*	*0.06-3*	*2*	*1*
Rinse-Off	*1*	*NR*	*NR*	*0.001-0.5*	*22*	*0.6-1*	*270*	*0.0005-30*	*3*	*NR*	*2*	*1*
Exposure Type												
Eye Area	NR	2	NR	NR	1	NR	108	0.1-8	7	0.2-0.7	NR	NR
Possible Ingestion	NR	NR	NR	NR	NR	15	128	0.5-26	2	3-Jan	NR	NR
Inhalation	NR	NR	NR	NR	NR	NR	17	0.001-3	NR	NR	NR	NR
Dermal Contact	1	0.3-4	NR	NR	22	0.6-15	1724	0.001-45	33	0.06-3	4	1
Deodorant (Underarm)	NR	NR	NR	NR	NR	NR	2	1	NR	NR	NR	NR
Hair - Non-Coloring	NR	NR	NR	NR	NR	NR	210	0.0005-3	5	2	NR	NR
Hair - Coloring	NR	NR	NR	0.001-3	NR	NR	4	NR	NR	NR	NR	NR
Nail	NR	NR	NR	NR	NR	0.01-1	7	0.01-60	NR	NR	NR	NR
Mucous Membrane	NR	NR	NR	NR	3	0.6	101	0.003-5	NR	NR	NR	NR
Bath Products	NR	NR	NR	NR	3	1	13	1	NR	NR	2	NR
Baby Products	NR	NR	NR	NR	NR	NR	24	0.01-5	NR	NR	NR	NR

	Camelina Sativa Seed Oil		Camellia Japonica Seed Oil		Camellia Kissi Seed Oil		Camellia Oleifera Seed Oil		Hydrogenated Camellia Oleifera Seed Oil		Camellia Sinensis Seed Oil	
Totals	**76**	**0.002-1**	**NR**	**0.01-0.2**	**47**	**NS**	**25**	**0.003-3**	**1**	**NR**	**12**	**0.1**
Duration of Use												
Leave-On	*61*	*0.002-1*	*NR*	*0.01-0.2*	*34*	*NS*	*23*	*0.003-3*	*1*	*NR*	*8*	*0.1*
Rinse-Off	*15*	*1*	*NR*	*0.1*	*13*	*NS*	*2*	*0.01-0.1*	*NR*	*NR*	*4*	*0.1*
Exposure Type												
Eye Area	NR	0.05	NR	0.01	4	NS	NR	2	NR	NR	NR	NR
Possible Ingestion	34	0.05-0.5	NR	0.1	1	NS	3	3	NR	NR	1	0.1
Inhalation	NR	NR	NR	NR	NR	NS	NR	NR	NR	NR	NR	NR
Dermal Contact	47	0.002-1	NR	0.01-0.2	36	NS	23	0.003-3	1	NR	10	0.1
Deodorant (Underarm)	NR	NR	NR	0.01	NR	NS	NR	NR	NR	NR	NR	0.1
Hair - Non-Coloring	29	1	NR	0.1	11	NS	2	2	NR	NR	2	0.1
Hair - Coloring	NR	NR	NR	NR	NR	NS	NR	NR	NR	NR	NR	NR
Nail	NR	NR	NR	NR	NR	NS	NR	NR	NR	NR	NR	NR
Mucous Membrane	NR	NR	NR	0.1	1	NS	NR	0.01-0.1	NR	NR	2	0.1
Bath Products	NR	NR	NR	NR	1	NS	NR	0.05	NR	NR	NR	NR
Baby Products	NR	NR	NR	NR	NR	NS	NR	NR	NR	NR	NR	NR

Table 5a. Frequency of use according to duration and exposure. (continued)

	No. of Uses 2010	Conc of Use (2010) (%)	No. of Uses 2010	Conc of Use (2010) (%)	No. of Uses 2010	Conc of Use (2010) (%)	No. of Uses 2010	Conc of Use (2010) (%)	No. of Uses 2010	Conc of Use (2010) (%)	No. of Uses 2010	Conc of Use (2010) (%)
	Canola Oil		Canola Oil Unsaponifiables		Hydrogenated Canola Oil		Carica Papaya Seed Oil		Caryocar Brasiliense Fruit Oil		Chenopodium Quinoa Seed Oil	
Totals	**132**	**0.0002-73**	**NR**	**0.001**	**3**	**NR**	**NR**	**0.1**	**31**	**0.0005-0.2**	**1**	**0.3**
Duration of Use												
Leave-On	*112*	*0.002-73*	*NR*	*NR*	*2*	*NR*	*NR*	*0.1*	*29*	*0.0005-2*	*1*	*NR*
Rinse-Off	*20*	*0.02-33*	*NR*	*0.0001*	*1*	*NR*	*NR*	*NR*	*2*	*NR*	*NR*	*0.3*
Exposure Type												
Eye Area	3	0.002-0.03	NR	NR	NR	NR	NR	NR	12	NR	NR	NR
Possible Ingestion	62	0.3-70	NR	NR	NR	NR	NR	NR	12	0.2	NR	NR
Inhalation	1	0.0002-17	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Dermal Contact	113	0.0002-73	NR	NR	3	NR	NR	0.1	30	0.0005-0.2	NR	NR
Deodorant (Underarm)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Hair - Non-Coloring	19	0.006-24	NR	0.001	NR	NR	NR	NR	1	NR	1	NR
Hair - Coloring	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	0.3
Nail	NR	5	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Mucous Membrane	2	0.02-1	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Bath Products	1	1-33	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Baby Products	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR

	Citrullus Lanatus (Watermelon) Seed Oil		Citrullus Vulgaris (Watermelon) Seed Oil**		Citrus Grandis (Grapefruit) Seed Oil		Citrus Paradisi (Grapefruit) Seed Oil		Citrus Medica Limonum (Lemon) Seed Oil**		Crambe Abyssinica Seed Oil	
Totals	**1**	**2**	**1**	**NR**	**NR**	**0.1**	**6**	**NR**	**5**	**NR**	**26**	**NS**
Duration of Use												
Leave-On	*1*	*2*	*1*	*NR*	*NR*	*0.1*	*5*	*NR*	*3*	*NR*	*15*	*NS*
Rinse-Off	*NR*	*NR*	*NR*	*NR*	*NR*	*0.1*	*1*	*NR*	*2*	*NR*	*11*	*NS*
Exposure Type												
Eye Area	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	1	NS
Possible Ingestion	NR	NR	NR	NR	NR	0.1	NR	NR	NR	NR	1	NS
Inhalation	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NS
Dermal Contact	1	2	1	NR	NR	0.1	6	NR	5	NR	8	NS
Deodorant (Underarm)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NS
Hair - Non-Coloring	NR	NR	NR	NR	NR	0.1	NR	NR	NR	NR	14	NS
Hair - Coloring	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	4	NS
Nail	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NS
Mucous Membrane	NR	NR	NR	NR	NR	0.1	1	NR	1	NR	NR	NS
Bath Products	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NS
Baby Products	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NS

Table 5a. Frequency of use according to duration and exposure. (continued)

	No. of Uses 2010	Conc of Use (2010) (%)	No. of Uses 2010	Conc of Use (2010) (%)	No. of Uses 2010	Conc of Use (2010) (%)	No. of Uses 2010	Conc of Use (2010) (%)	No. of Uses 2010	Conc of Use (2010) (%)	No. of Uses 2010	Conc of Use (2010) (%)
	Cucumis Sativus (Cucumber) Seed Oil		Cucurbita Pepo (Pumpkin) Seed Oil		Palm Kernel Acid		Potassium Palm Kernelate		Potassium Palmate		Sodium Palm Kernelate	
Totals	**6**	**NR**	**18**	**0.003-0.1**	**72**	**0.2-12**	**7**	**0.3-30**	**5**	**0.3-3**	**194**	**12-44**
Duration of Use												
Leave-On	*5*	*NR*	*17*	*0.003-0.1*	*3*	*NR*	*NR*	*NR*	*NR*	*NR*	*10*	*NR*
Rinse-Off	*1*	*NR*	*1*	*NR*	*69*	*0.2-12*	*7*	*0.3-30*	*5*	*0.3-3*	*184*	*12-44*
Exposure Type												
Eye Area	1	NR	1	0.003	NR	NR	NR	NR	NR	NR	NR	NR
Possible Ingestion	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Inhalation	NR	NR	1	NR	NR	NR	NR	NR	NR	NR	1	NR
Dermal Contact	5	NR	18	0.003-0.1	71	0.2-12	7	0.3-30	5	0.3-3	194	12-44
Deodorant (Underarm)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Hair - Non-Coloring	1	NR	1	NR	1	NR	NR	NR	NR	NR	NR	NR
Hair - Coloring	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Nail	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Mucous Membrane	NR	NR	NR	NR	64	0.2-3	1	0.3-30	2	0.3-3	173	16-44
Bath Products	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	3	NR
Baby Products	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	4	NR

	Sodium Palmate		Palm Acid		Elaeis Oleifera Kernel Oil		Euterpe Oleracea Fruit Oil		Garcinia Indica Seed Butter		Gevuina Avellana Oil	
Totals	**212**	**3-68**	**33**	**1-17**	**5**	**NR**	**29**	**0.00001-0.5**	**30**	**NS**	**5**	**0.002-0.2**
Duration of Use												
Leave-On	*7*	*NR*	*1*	*NR*	*NR*	*NR*	*19*	*0.00001-0.5*	*27*	*NS*	*5*	*0.04-0.2*
Rinse-Off	*205*	*3-68*	*32*	*1-17*	*5*	*NR*	*10*	*0.05*	*3*	*NS*	*NR*	*0.002-0.01*
Exposure Type												
Eye Area	NR	NR	NR	NR	NR	NR	2	0.5	1	NS	NR	NR
Possible Ingestion	NR	NR	NR	NR	NR	NR	1	0.002	3	NS	NR	NR
Inhalation	1	NR	1	NR	NR	NR	1	NR	NR	NS	NR	NR
Dermal Contact	212	3-68	33	1-17	NR	NR	14	0.00001-0.5	30	NS	4	0.002-0.2
Deodorant (Underarm)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NS	NR	NR
Hair - Non-Coloring	NR	NR	NR	NR	2	NR	15	NR	NR	NS	NR	NR
Hair - Coloring	NR	NR	NR	NR	3	NR	NR	NR	NR	NS	NR	NR
Nail	NR	NR	NR	NR	NR	NR	NR	NR	NR	NS	NR	NR
Mucous Membrane	189	3-68	31	1-4	NR	NR	3	NR	1	NS	NR	NR
Bath Products	1	NR	NR	NR	NR	NR	NR	NR	NR	NS	NR	NR
Baby Products	3	NR	NR	NR	NR	NR	NR	NR	NR	NS	NR	NR

Table 5a. Frequency of use according to duration and exposure. (continued)

	No. of Uses 2010	Conc of Use (2010) (%)	No. of Uses 2010	Conc of Use (2010) (%)	No. of Uses 2010	Conc of Use (2010) (%)	No. of Uses 2010	Conc of Use (2010) (%)	No. of Uses 2010	Conc of Use (2010) (%)	No. of Uses 2010	Conc of Use (2010) (%)
	Glycine Soja (Soybean) Oil		Glycine Soja (Soybean) Oil Unspaonifiables		Hydrogenated Soybean Oil		Helianthus Annuus (Sunflower) Seed Oil		Helianthus Annuus (Sunflower) Seed Oil Unsaponifiables		Hydrogenated Sunflower Oil	
Totals	**912**	**0.0002-95**	**12**	**0.0001-0.2**	**36**	**0.001-42**	**1414**	**0.000007-96**	**10**	**0.005-2**	**NR**	**6-35**
Duration of Use												
Leave-On	*718*	*0.0005-95*	*12*	*0.0001-0.2*	*33*	*0.001-39*	*1054*	*0.0002-96*	*10*	*0.005-2*	*NR*	*6-35*
Rinse-Off	*194*	*0.0002-95*	*NR*	*NR*	*3*	*0.05-42*	*360*	*0.000007-92*	*NR*	*0.002*	*NR*	*15-35*
Exposure Type												
Eye Area	53	0.04-2	NR	NR	4	0.03-7	64	0.0005-19	2	0.02	NR	7
Possible Ingestion	103	0.6-4	NR	NR	3	0.1-39	260	0.08-41	NR	NR	NR	6
Inhalation	6	0.03-0.5	NR	NR	NR	NR	3	0.0002-85	NR	NR	NR	NR
Dermal Contact	800	0.0005-93	12	0.0001-0.2	34	0.01-39	707	0.0002-96	10	0.005-2	NR	6-35
Deodorant (Underarm)	NR	0.01-0.5	NR	NR	NR	NR	1	0.0003-4	NR	NR	NR	NR
Hair - Non-Coloring	97	0.0002-95	NR	NR	1	0.1	179	0.000007-92	NR	NR	NR	NR
Hair - Coloring	5	NR	NR	NR	NR	NR	85	0.03-35	NR	NR	NR	15-35
Nail	6	0.02-95	NR	NR	NR	0.001-25	8	0.05-30	NR	NR	NR	NR
Mucous Membrane	70	0.01-52	NR	NR	NR	0.05-6	52	0.0003-4	NR	0.002	NR	NR
Bath Products	19	0.1-78	NR	NR	NR	5-42	11	0.005-75	NR	NR	NR	NR
Baby Products	21	2	NR	NR	NR	NR	18	0.2	NR	NR	NR	NR

	Hippophae Rhamnoides Oil		Hippophae Rhamnoides Fruit Oil		Irvingia Gabonensis Kernel Butter		Juglans Regia (Walnut) Seed Oil		Limnanthes Alba (Meadowfoam) Seed Oil		Linum Usitatissimum (Linseed) Seed Oil	
Totals	**15**	**NS**	**7**	**NS**	**109**	**0.003-0.4**	**15**	**0.00003-0.2**	**316**	**0.002-74**	**102**	**0.001-10**
Duration of Use												
Leave-On	*10*	*NS*	*7*	*NS*	*109*	*0.003-0.4*	*12*	*0.01-0.2*	*225*	*0.002-74*	*52*	*0.002-10*
Rinse-Off	*5*	*NS*	*NR*	*NS*	*NR*	*NR*	*3*	*0.00003-0.1*	*91*	*0.01-2*	*50*	*0.001-0.4*
Exposure Type												
Eye Area	NR	NS	1	NS	2	NR	1	NR	30	0.1-20	3	0.01
Possible Ingestion	NR	NS	NR	NS	64	0.003-0.3	NR	NR	67	0.6-26	NR	0.01
Inhalation	NR	NS	NR	NS	NR	NR	NR	NR	1	0.1-3	3	NR
Dermal Contact	1	NS	6	NS	108	0.003-0.4	15	0.003-0.2	211	0.002-74	58	0.003-4
Deodorant (Underarm)	NR	NS	NR	NS	NR	NR	NR	NR	NR	NR	NR	0.05-0.1
Hair - Non-Coloring	6	NS	NR	NS	1	NR	NR	0.00003-0.1	47	0.1-1	42	0.001-0.1
Hair - Coloring	NR	NS	NR	NS	NR	NR	NR	NR	46	0.2-2	NR	NR
Nail	8	NS	1	NS	NR	NR	NR	NR	NR	0.5	2	0.002-0.05
Mucous Membrane	1	NS	NR	NS	NR	NR	NR	NR	4	0.001-0.6	5	0.003-0.4
Bath Products	NR	NS	NR	NS	NR	NR	2	NR	2	0.5-0.9	1	0.02-0.2
Baby Products	NR	NS	NR	NS	NR	NR	NR	NR	1	NR	2	NR

Table 5a. Frequency of use according to duration and exposure. (continued)

	No. of Uses 2010	Conc of Use (2010) (%)	No. of Uses 2010	Conc of Use (2010) (%)	No. of Uses 2010	Conc of Use (2010) (%)	No. of Uses 2010	Conc of Use (2010) (%)	No. of Uses 2010	Conc of Use (2010) (%)	No. of Uses 2010	Conc of Use (2010) (%)
	Linseed Acid		Luffa Cylindrica Seed Oil		Lupinus Albus Seed Oil		Lycium Barbarum Seed Oil		Macadamia Integrifolia Seed Oil		Macadamia Ternifolia Seed Oil	
Totals	**3**	**NR**	**21**	**NS**	**1**	**NS**	**2**	**NS**	**41**	**0.01-5**	**533**	**0.0003-30**
Duration of Use												
Leave-On	*3*	*NR*	*21*	*NS*	*1*	*NS*	*2*	*NS*	*25*	*0.05-5*	*482*	*0.001-30*
Rinse-Off	*NR*	*NR*	*NR*	*NS*	*NR*	*NS*	*NR*	*NS*	*16*	*0.01-3*	*51*	*0.0003-10*
Exposure Type												
Eye Area	NR	NR	1	NS	NR	NS	1	NS	3	0.1	16	0.1-15
Possible Ingestion	NR	NR	9	NS	NR	NS	1	NS	4	1	33	0.1-30
Inhalation	NR	NR	NR	NS	NR	NS	NR	NS	NR	0.5	12	0.007-16
Dermal Contact	3	NR	21	NS	1	NS	2	NS	36	0.05-5	493	0.001-30
Deodorant (Underarm)	NR	NR	NR	NS	NR	NS	NR	NS	NR	NR	NR	NR
Hair - Non-Coloring	NR	NR	NR	NS	NR	NS	NR	NS	12	0.01-0.03	33	0.0003-16
Hair - Coloring	NR	NR	NR	NS	NR	NS	NR	NS	NR	NR	3	0.02
Nail	NR	NR	NR	NS	NR	NS	NR	NS	NR	3	1	0.001-0.5
Mucous Membrane	NR	NR	NR	NS	NR	NS	NR	NS	10	2	12	0.02-10
Bath Products	NR	NR	NR	NS	NR	NS	NR	NS	1	0.5	2	1-10
Baby Products	1	NR	NR	NS	NR	NS	NR	NS	NR	NR	4	NR

	Macadamia Nut Oil**		Mangifera Indica (Mango) Seed Oil		Mangifera Indica (Mango) Seed Butter		Sodium Mangoseedate		Moringa Oleifera Seed Oil		Moringa Pterygosperma Seed Oil	
Totals	**208**	**NS**	**72**	**0.003-6**	**175**	**0.0005-3**	**1**	**NR**	**NR**	**0.001**	**15**	**0.003-3**
Duration of Use												
Leave-On	*191*	*NS*	*64*	*0.003-6*	*134*	*0.01-5*	*NR*	*NR*	*NR*	*0.001*	*13*	*0.004-3*
Rinse-Off	*17*	*NS*	*8*	*0.05-0.2*	*41*	*0.0005-0.5*	*1*	*NR*	*NR*	*NR*	*2*	*0.003*
Exposure Type												
Eye Area	22	NS	13	5	6	0.02	NR	NR	NR	NR	4	3
Possible Ingestion	11	NS	7	0.03-6	25	1-5	NR	NR	NR	NR	1	NR
Inhalation	2	NS	1	NR	2	0.02	NR	NR	NR	NR	NR	NR
Dermal Contact	170	NS	60	0.003-6	147	0.0005-5	1	NR	NR	0.001	11	0.003-3
Deodorant (Underarm)	NR	NS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Hair - Non-Coloring	9	NS	12	0.05-0.2	12	0.02-0.5	NR	NR	NR	NR	1	0.02
Hair - Coloring	NR	NS	NR	0.05	16	NR	NR	NR	NR	NR	NR	NR
Nail	NR	NS	NR	NR	NR	0.5	NR	NR	NR	NR	NR	NR
Mucous Membrane	NR	NS	2	0.1	10	0.0005-0.5	1	NR	NR	NR	NR	0.003
Bath Products	1	NS	NR	NR	1	NR	NR	NR	NR	NR	NR	NR
Baby Products	NR	NS	NR	NR	3	NR	NR	NR	NR	NR	NR	NR

Table 5a. Frequency of use according to duration and exposure. (continued)

	No. of Uses 2010	Conc of Use (2010) (%)	No. of Uses 2010	Conc of Use (2010) (%)	No. of Uses 2010	Conc of Use (2010) (%)	No. of Uses 2010	Conc of Use (2010) (%)	No. of Uses 2010	Conc of Use (2010) (%)	No. of Uses 2010	Conc of Use (2010) (%)
	Oenothera Biennis (Evening Primrose) Oil		Hydrogenated Evening Primrose Oil		Olea Europea (Olive) Fruit Oil		Olea Europaea (Olive) Oil Unsaponifiables		Hydrogenated Olive Oil		Hydogenated Olive Oil Unsaponifiables	
Totals	**150**	**0.00002-58**	**14**	**NR**	**915**	**0.0005-100**	**77**	**0.0001-3**	**50**	**0.0005-12**	**2**	**0.05-5**
Duration of Use												
Leave-On	*113*	*0.00002-58*	*14*	*NR*	*617*	*0.001-100*	*68*	*0.0001-3*	*36*	*0.1-12*	*2*	*0.05-5*
Rinse-Off	*37*	*0.002-0.2*	*NR*	*NR*	*298*	*0.0005-94*	*9*	*0.04-0.3*	*14*	*0.0005-0.1*	*NR*	*NR*
Exposure Type												
Eye Area	4	0.00002-0.5	1	NR	26	0.004-17	12	0.02-0.4	13	0.1-3	NR	0.3-2
Possible Ingestion	14	0.1-15	NR	NR	26	0.7-26	1	0.08	7	0.1-12	NR	NR
Inhalation	2	NR	NR	NR	6	0.2-5	NR	3	NR	NR	NR	NR
Dermal Contact	109	0.00002-58	14	NR	711	0.0005-100	67	0.0001-3	34	0.0005-12	2	0.05-5
Deodorant (Underarm)	NR	0.2	NR	NR	3	0.02-0.1	NR	NR	NR	NR	NR	NR
Hair - Non-Coloring	37	0.05-0.1	NR	NR	190	0.006-94	6	0.02-0.3	11	0.01-0.1	NR	NR
Hair - Coloring	NR	NR	NR	NR	NR	0.2-0.5	NR	NR	NR	NR	NR	NR
Nail	4	0.001-3	NR	NR	5	1-40	NR	NR	NR	NR	NR	NR
Mucous Membrane	4	0.1-0.2	NR	NR	121	0.0005-3	4	NR	1	0.0005	NR	NR
Bath Products	2	0.2	NR	NR	14	0.9-17	NR	NR	NR	NR	NR	NR
Baby Products	3	NR	NR	NR	9	0.2	NR	0.04	NR	0.4	NR	NR

	Potassium Olivate		Sodium Olivate		Orbignya Cohune Seed Oil		Orbignya Oleifera Seed Oil		Sodium Babassuate		Orbignya Speciosa Kernel Oil	
Totals	**3**	**NR**	**16**	**4-18**	**1**	**NR**	**161**	**0.0009-27**	**NR**	**8**	**8**	**NS**
Duration of Use												
Leave-On	*NR*	*NR*	*5*	*NR*	*NR*	*NR*	*118*	*0.0009-4*	*NR*	*NR*	*1*	*NS*
Rinse-Off	*3*	*NR*	*11*	*4-18*	*1*	*NR*	*43*	*0.01-27*	*NR*	*8*	*7*	*NS*
Exposure Type												
Eye Area	NR	NR	NR	NR	NR	NR	7	0.5-0.6	NR	NR	NR	NS
Possible Ingestion	NR	NR	NR	NR	NR	NR	57	0.001-2	NR	NR	NR	NS
Inhalation	NR	NR	NR	NR	NR	NR	5	0.02-2	NR	NR	NR	NS
Dermal Contact	3	NR	16	4-18	NR	NR	110	0.0009-27	NR	8	NR	NS
Deodorant (Underarm)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NS
Hair - Non-Coloring	NR	NR	NR	NR	1	NR	43	0.02-2	NR	NR	5	NS
Hair - Coloring	NR	NR	NR	NR	NR	NR	8	NR	NR	NR	3	NS
Nail	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NS
Mucous Membrane	1	NR	9	4-18	NR	NR	5	27	NR	8	NR	NS
Bath Products	NR	NR	NR	NR	NR	NR	2	0.01-0.1	NR	NR	NR	NS
Baby Products	NR	NR	1	NR	NR	NR	NR	NR	NR	NR	NR	NS

Table 5a. Frequency of use according to duration and exposure. (continued)

	No. of Uses 2010	Conc of Use (2010) (%)	No. of Uses 2010	Conc of Use (2010) (%)	No. of Uses 2010	Conc of Use (2010) (%)	No. of Uses 2010	Conc of Use (2010) (%)	No. of Uses 2010	Conc of Use (2010) (%)	No. of Uses 2010	Conc of Use (2010) (%)
	Passiflora Edulis Seed Oil		Perilla Ocymoides Seed Oil		Persea Gratissima (Avocado) Oil Unsaponifiables		Hydrogenated Avocado Oil		Persea Gratissima (Avocado) Butter		Sodium Avocadoate	
Totals	**62**	**NS**	**7**	**NR**	**63**	**0.2-6**	**11**	**0.5**	**15**	**NR**	**1**	**NR**
Duration of Use												
Leave-On	*53*	*NS*	*5*	*NR*	*57*	*0.5-6*	*9*	*NR*	*15*	*NR*	*NR*	*NR*
Rinse-Off	*9*	*NS*	*2*	*NR*	*6*	*0.2*	*2*	*0.5*	*NR*	*NR*	*1*	*NR*
Exposure Type												
Eye Area	3	NS	2	NR	9	0.5	NR	NR	NR	NR	NR	NR
Possible Ingestion	14	NS	NR	NR	2	3	2	NR	11	NR	NR	NR
Inhalation	3	NS	NR	NR	4	NR	NR	NR	NR	NR	NR	NR
Dermal Contact	49	NS	5	NR	56	0.2-3	8	NR	15	NR	1	NR
Deodorant (Underarm)	NR	NS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Hair - Non-Coloring	10	NS	2	NR	2	6	3	0.5	NR	NR	NR	NR
Hair - Coloring	3	NS	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Nail	NR	NS	NR	NR	3	NR	NR	NR	NR	NR	NR	NR
Mucous Membrane	1	NS	NR	NR	NR	NR	NR	NR	NR	NR	1	NR
Bath Products	NR	NS	NR	NR	4	NR	NR	NR	NR	NR	NR	NR
Baby Products	NR	NS	NR	NR	1	NR	NR	NR	NR	NR	NR	NR

	Pistacia Vera Seed Oil		Plukenetia Volubilis Seed Oil		Hydrogenated Sweet Almond Oil		Sodium Sweet Almondate		Prunus Armeniaca (Apricot) Kernel Oil		Hydrogenated Apricot Kernel Oil	
Totals	**158**	**0.003-1**	**13**	**0.05-0.6**	**21**	**0.5**	**4**	**15**	**588**	**0.00001-89**	**2**	**NR**
Duration of Use												
Leave-On	*107*	*0.08-0.2*	*12*	*0.05-0.6*	*13*	*0.5*	*4*	*NR*	*449*	*0.0001-40*	*2*	*NR*
Rinse-Off	*51*	*0.003-1*	*1*	*NR*	*8*	*0.5*	*NR*	*15*	*139*	*0.00001-89*	*NR*	*NR*
Exposure Type												
Eye Area	7	NR	1	NR	NR	NR	NR	NR	25	0.002-18	NR	NR
Possible Ingestion	6	NR	3	0.6	1	NR	NR	NR	38	0.001-5	NR	NR
Inhalation	NR	NR	NR	NR	NR	NR	NR	NR	5	0.0009-1	NR	NR
Dermal Contact	133	0.003-0.2	13	0.6	15	0.5	4	15	486	0.00001-18	2	NR
Deodorant (Underarm)	NR	NR	NR	NR	NR	NR	NR	NR	1	0.003-0.1	NR	NR
Hair - Non-Coloring	16	0.05-1	NR	NR	6	0.5	NR	NR	78	0.0001-89	NR	NR
Hair - Coloring	NR	NR	NR	NR	NR	NR	NR	NR	10	0.1	NR	NR
Nail	NR	NR	NR	0.05	NR	NR	NR	NR	10	0.002-40	NR	NR
Mucous Membrane	19	NR	NR	NR	1	NR	NR	15	24	0.01-9	NR	NR
Bath Products	8	NR	NR	NR	1	NR	NR	NR	8	4	NR	NR
Baby Products	3	NR	NR	NR	NR	NR	NR	NR	7	NR	NR	NR

Table 5a. Frequency of use according to duration and exposure. (continued)

	No. of Uses 2010	Conc of Use (2010) (%)	No. of Uses 2010	Conc of Use (2010) (%)	No. of Uses 2010	Conc of Use (2010) (%)	No. of Uses 2010	Conc of Use (2010) (%)	No. of Uses 2010	Conc of Use (2010) (%)	No. of Uses 2010	Conc of Use (2010) (%)
	Prunus Avium (Sweet Cherry) Seed Oil		Prunus Domestica Seed Oil		Prunus Persica (Peach) Kernel Oil		Punica Granatum Seed Oil		Pyrus Malus (Apple) Seed Oil		Ribes Nigrum (Black Currant) Seed Oil	
Totals	**2**	**0.01-0.02**	**NR**	**0.04**	**22**	**0.003-22**	**46**	**NS**	**8**	**NR**	**53**	**0.000001-0.3**
Duration of Use												
Leave-On	*NR*	*NR*	*NR*	*NR*	*16*	*0.05-22*	*44*	*NS*	*8*	*NR*	*45*	*0.000001-0.3*
Rinse-Off	*2*	*0.01-0.02*	*NR*	*0.04*	*6*	*0.003-6*	*2*	*NS*	*NR*	*NR*	*8*	*0.05*
Exposure Type												
Eye Area	NR	NR	NR	NR	NR	NR	2	NS	NR	NR	2	0.08
Possible Ingestion	NR	NR	NR	NR	NR	0.04-22	30	NS	1	NR	7	0.03-0.1
Inhalation	NR	NR	NR	NR	NR	2	NR	NS	NR	NR	NR	NR
Dermal Contact	2	0.01-0.02	NR	0.04	18	0.003-22	46	NS	8	NR	43	0.000001-0.3
Deodorant (Underarm)	NR	NR	NR	NR	NR	NR	NR	NS	NR	NR	NR	NR
Hair - Non-Coloring	NR	NR	NR	NR	4	NR	NR	NS	NR	NR	5	NR
Hair - Coloring	NR	NR	NR	NR	NR	0.1	NR	NS	NR	NR	NR	NR
Nail	NR	NR	NR	NR	NR	NR	NR	NS	NR	NR	5	0.2
Mucous Membrane	2	0.01-0.02	NR	NR	1	NR	2	NS	NR	NR	2	NR
Bath Products	NR	NR	NR	NR	1	0.1-1	NR	NS	NR	NR	NR	NR
Baby Products	NR	NR	NR	NR	NR	NR	NR	NS	NR	NR	NR	NR

	Rosa Canina Fruit Oil		Rubus Chamaemorus Seed Oil		Rubus Idaeus (Raspberry) Seed Oil		Schinziophyton Rautanenii Kernel Oil		Sclerocarya Birrea Seed Oil		Silybum Marianum Seed Oil	
Totals	**121**	**NS**	**3**	**NS**	**10**	**0.1-5**	**6**	**NR**	**29**	**1**	**NR**	**0.5**
Duration of Use												
Leave-On	*106*	*NS*	*3*	*NS*	*8*	*0.1-5*	*4*	*NR*	*23*	*1*	*NR*	*0.5*
Rinse-Off	*15*	*NS*	*NR*	*NS*	*2*	*NR*	*2*	*NR*	*6*	*1*	*NR*	*NR*
Exposure Type												
Eye Area	17	NS	NR	NS	NR	NR	NR	NR	NR	NR	NR	NR
Possible Ingestion	7	NS	NR	NS	1	NR	NR	NR	6	NR	NR	NR
Inhalation	1	NS	NR	NS	NR	NR	NR	NR	2	NR	NR	NR
Dermal Contact	109	NS	3	NS	8	0.1-5	3	NR	23	1	NR	0.5
Deodorant (Underarm)	NR	NS	NR	NS	NR	NR	NR	NR	NR	NR	NR	NR
Hair - Non-Coloring	9	NS	NR	NS	NR	NR	3	NR	6	1	NR	NR
Hair - Coloring	NR	NS	NR	NS	NR	NR	NR	NR	NR	NR	NR	NR
Nail	1	NS	NR	NS	NR	NR	NR	NR	NR	NR	NR	NR
Mucous Membrane	3	NS	NR	NS	2	NR	NR	NR	2	NR	NR	NR
Bath Products	1	NS	NR	NS	1	NR	NR	NR	NR	NR	NR	NR
Baby Products	NR	NS	NR	NS	NR	NR	NR	NR	NR	NR	NR	NR

Table 5a. Frequency of use according to duration and exposure. (continued)

	No. of Uses 2010	Conc of Use (2010) (%)	No. of Uses 2010	Conc of Use (2010) (%)	No. of Uses 2010	Conc of Use (2010) (%)	No. of Uses 2010	Conc of Use (2010) (%)	No. of Uses 2010	Conc of Use (2010) (%)	No. of Uses 2010	Conc of Use (2010) (%)
	Solanum Lycopersicum (Tomato) Fruit Oil		Solanum Lycopersicum (Tomato) Seed Oil		Theobroma Cacao (Cocoa) Seed Butter		Theobroma Grandiflorum Seed Butter		Triticum Vulgare (Wheat) Germ Oil Unsaponifiables		Wheat Germ Acid	
Totals	**NR**	**0.01-1**	**1**	**NR**	**442**	**0.000002-37**	**153**	**0.00005-7**	**17**	**0.2**	**16**	**NR**
Duration of Use												
Leave-On	*NR*	*0.001-1*	*1*	*NR*	*367*	*0.000002-37*	*119*	*0.00005-7*	*17*	*0.2*	*3*	*NR*
Rinse-Off	*NR*	*NR*	*NR*	*NR*	*75*	*0.0001-2*	*34*	*0.001-1*	*NR*	*NR*	*13*	*NR*
Exposure Type												
Eye Area	NR	0.01	NR	NR	11	0.0002-9	21	0.1-2	1	NR	NR	NR
Possible Ingestion	NR	0.001	NR	NR	33	37	49	7	NR	NR	NR	NR
Inhalation	NR	NR	NR	NR	2	0.4	NR	NR	NR	NR	NR	NR
Dermal Contact	NR	0.001-1	1	NR	417	0.000002-37	141	0.00005-7	17	0.2	NR	NR
Deodorant (Underarm)	NR	NR	NR	NR	NR	0.001-1	NR	0.1	NR	NR	NR	NR
Hair - Non-Coloring	NR	NR	NR	NR	24	0.01-2	9	0.001-1	NR	NR	16	NR
Hair - Coloring	NR	NR	NR	NR	NR	0.1	3	NR	NR	NR	NR	NR
Nail	NR	NR	NR	NR	NR	0.1-1	NR	NR	NR	NR	NR	NR
Mucous Membrane	NR	NR	NR	NR	35	0.02-2	19	0.05-0.1	NR	NR	NR	NR
Bath Products	NR	NR	NR	NR	4	0.1-1	4	NR	NR	NR	NR	NR
Baby Products	NR	NR	NR	NR	8	0.01	NR	NR	NR	NR	NR	NR

	Vaccinium Macrocarpon (Cranberry) Seed Oil		Vaccinium Oxycoccos (Cranberrry) Seed Oil**		Vaccinium Myrtillus Seed Oil		Vaccinium Vitis-Idaea Seed Oil		Vegetable (Olus) Oil		Hydrogenated Vegetable Oil	
Totals	**21**	**0.002-2**	**4**	**NS**	**33**	**NS**	**9**	**NS**	**165**	**0.0005-31**	**457**	**0.0004-60**
Duration of Use												
Leave-On	*18*	*0.002-2*	*3*	*NS*	*32*	*NS*	*9*	*NS*	*135*	*0.0005-11*	*439*	*0.0005-60*
Rinse-Off	*3*	*0.003-0.1*	*1*	*NS*	*1*	*NS*	*NR*	*NS*	*30*	*0.002-31*	*18*	*0.0004-8*
Exposure Type												
Eye Area	2	NR	NR	NS	NR	NS	NR	NS	11	0.01-11	102	0.008-49
Possible Ingestion	NR	0.3	NR	NS	29	NS	NR	NS	74	0.03-11	216	0.8-60
Inhalation	NR	NR	NR	NS	NR	NS	NR	NS	1	0.0005-0.02	1	3
Dermal Contact	17	0.002-2	4	NS	33	NS	1	NS	143	0.0005-31	450	0.005-60
Deodorant (Underarm)	NR	NR	NR	NS	NR	NS	NR	NS	NR	---	NR	NR
Hair - Non-Coloring	4	0.01-0.1	NR	NS	NR	NS	NR	NS	2	0.02-2	2	0.0005-0.09
Hair - Coloring	NR	NR	NR	NS	NR	NS	NR	NS	18	---	NR	0.0004-1
Nail	NR	NR	NR	NS	NR	NS	8	NS	1	2	1	0.2
Mucous Membrane	1	0.003-0.1	NR	NS	NR	NS	NR	NS	1	0.03-2	2	2-4
Bath Products	NR	NR	NR	NS	NR	NS	NR	NS	2	0.002-0.02	NR	0.5
Baby Products	NR	NR	NR	NS	NR	NS	NR	NS	1	---	NR	NR

Table 5a. Frequency of use according to duration and exposure. (continued)

	No. of Uses 2010	Conc of Use (2010) (%)	No. of Uses 2010	Conc of Use (2010) (%)	No. of Uses 2010	Conc of Use (2010) (%)
	Vitis Vinifera (Grape) Seed Oil		Hydrogenated Grapeseed Oil		Sodium Grapeseedate	
Totals	**465**	**0.001-43**	**7**	**0.3-0.5**	**4**	**NR**
Duration of Use						
Leave-On	*368*	*0.001-41*	*4*	*0.3-0.5*	*4*	*NR*
Rinse-Off	*97*	*0.001-43*	*3*	*0.5*	*NR*	*NR*
Exposure Type						
Eye Area	14	0.01-5	NR	NR	NR	NR
Possible Ingestion	34	0.03-7	1	0.5	NR	NR
Inhalation	6	0.001-7	NR	NR	NR	NR
Dermal Contact	401	0.001-41	5	0.5	NR	NR
Deodorant (Underarm)	NR	0.001-0.2	NR	NR	NR	NR
Hair - Non-Coloring	46	0.01-0.3	1	NR	4	NR
Hair - Coloring	10	43	NR	NR	NR	NR
Nail	8	0.001-35	1	0.3	NR	NR
Mucous Membrane	21	0.001-7	1	NR	NR	NR
Bath Products	8	0.01-2	NR	NR	NR	NR
Baby Products	5	NR	NR	NR	NR	NR

*Note - Because each ingredient may be used in cosmetics with multiple exposure types, the sum of all exposure types my not equal the sum of total uses.

NR - not reported to the VCRP or Council

NS - not surveyed

**not listed as an INCI name; included because of similarity

Table 5b. Current and historical frequency and concentration of use according to duration and type of exposure - previously reviewed ingredients

	# of Uses		Conc. of Use (%)		# of Uses		Conc. of Use (%)		# of Uses		Conc. of Use (%)		# of Uses		Conc. of Use (%)	
	Arachis Hypogaea (Peanut) Oil				Hydrogenated Peanut Oil				Carthamus Tinctorius (Safflower) Seed Oil				Cocos Nucifera (Coconut) Oil			
data year	*1998*	*2010*	*1984*	*2010*	*1998*	*2010*	*1998*	*2010*	***2002***	***2010***	***2003***	***2010***	*2007*	*2010*	*2008*	*2010*
Totals*	**22**	**74**	**mostly ≤25; >50 (1 use)**	**0.0001-30**	**19**	**12**	**	**2-5**	**142**	**508**	**0.00005-84**	**NS**	**626**	**798**	**0.0001-80**	**NS**
Duration of Use																
Leave-On	*14*	*59*	**	*0.0001-1*	*19*	*12*	**	*2-5*	*114*	*402*	*0.00005-84*	*NS*	*243*	*409*	*0.005-80*	*NS*
Rinse Off	*8*	*15*	**	*0.0002-30*	*NR*	*NR*	**	*NR*	*28*	*106*	*0.001-72*	*NS*	*383*	*389*	*0.0001-16*	*NS*
Exposure Type																***NS***
Eye Area	NR	4	**	NR	NR	NR	**	NR	5	15	1-6	NS	7	25	0.01-80	NS
Possible Ingestion	3	NR	**	NR	NR	NR	**	2	18	83	0.1-60	NS	19	44	0.2-51	NS
Inhalation	NR	2	**	NR	NR	NR	**	NR	3	5	5	NS	7	10	0.01-26	NS
Dermal Contact	19	53	**	0.0001-1	19	12	**	2-5	113	395	0.001-72	NS	380	548	0.005-80	NS
Deodorant (underarm)	NR	NR	**	NR	NR	NR	**	NR	NR	NR	NR	NS	NR	NR	0.1-16	NS
Hair - Non-Coloring	3	21	**	25-30	NR	NR	**	NR	28	79	0.00005-27	NS	97	176	0.0001-13	NS
Hair-Coloring	NR	NR	**	NR	NR	NR	**	NR	NR	20	1	NS	145	69	NR	NS
Nail	NR	NR	**	NR	NR	NR	**	NR	1	32	84	NS	2	5	0.005-2	NS
Mucous Membrane	4	2	**	NR	NR	NR	**	NR	NR	31	NR	NS	12	161	0.0005-16	NS
Bath Products	NR	NR	**	NR	NR	NR	**	NR	NR	3	7	NS	141	15	0.004-23	NS
Baby Products	NR	NR	**	NR	NR	NR	**	NR	NR	6	10	NS	12	15	0.010-0.3	NS

	Hydrogenated Coconut Oil				Magnesium Cocoate				Potassium Cocoate				Sodium Cocoate			
data year	*2007*	*2010*	*2008*	*2010*	*2007*	*2010*	*2008*	*2010*	*2007*	*2010*	*2008*	*2010*	*2007*	*2010*	*2008*	*2010*
Totals	**62**	**105**	**0.001-50**	**NS**	**11**	**9**	**NR**	**NS**	**24**	**40**	**0.003-40**	**NS**	**230**	**340**	**1-52**	**NS**
Duration of Use																
Leave-On	*55*	*79*	*0.001-50*	*NS*	*NR*	*NR*	*NR*	*NS*	*4*	*NR*	*28*	*NS*	*12*	*16*	*NR*	*NS*
Rinse-Off	*7*	*26*	*0.001-38*	*NS*	*11*	*9*	*NR*	*NS*	*20*	*40*	*0.03-40*	*NS*	*218*	*324*	*1-52*	*NS*
Exposure Type																
Eye Area	9	7	0.2-22	NS	NR	NR	NR	NS	NR	NR	NR	NS	NR	NR	NR	NS
Possible Ingestion	6	10	0.7-29	NS	NR	NR	NR	NS	NR	NR	NR	NS	NR	NR	NR	NS
Inhalation	NR	NR	0.3	NS	NR	NR	NR	NS	NR	NR	NR	NS	1	NR	NR	NS
Dermal Contact	3	102	0.001-25	NS	11	9	NR	NS	22	38	0.3-40	NS	175	269	1-52	NS
Deodorant (underarm)	NR	NR	NR	NS	NR	NR	NR	NS	NR	NR	NR	NS	NR	NR	NR	NS
Hair - Non-Coloring	3	3	0.001-2	NS	NR	NR	NR	NS	2	2	15	NS	55	71	2	NS
Hair-Coloring	NR	NR	0.5-0.6	NS	NR	NR	NR	NS	NR	NR	0.003	NS	NR	NR	NR	NS
Nail	NR	NR	0.8-25	NS	NR	NR	NR	NS	NR	NR	NR	NS	NR	NR	NR	NS
Mucous Membrane	NR	18	1-17	NS	NR	NR	NR	NS	NR	8	0.3	NS	1	238	1-2	NS
Bath Products	1	NR	0.5-39	NS	NR	NR	NR	NS	11	NR	0.3-40	NS	149	3	1-52	NS

Baby Products	1	1	2-50	NS	NR	NR	NR	NS	NR	NR	NR	NS	2	5	NR	NS

Table 5b. Current and historical frequency and concentration of use according to duration and type of exposure - previously reviewed ingredients (continued)

	# of Uses		Conc. of Use (%)		# of Uses		Conc. of Use (%)		# of Uses		Conc. of Use (%)		# of Uses		Conc. of Use (%)	
	Coconut Acid				Hydrogenated Coconut Acid				Corylus Americana (Hazel) Seed Oil				Corylus Avellana (Hazel) Seed Oil			
data year	*2007*	*2010*	*2008*	*2010*	*2007*	*2010*	*2008*	*2010*	*1998#*	*2010*	*1998*	*2010*	*1998#*	*2010*	*1997*	*2010*
Totals	**142**	**141**	**0.03-14**	**NS**	**NR**	**NR**	**6-10**	**NS**	#	**10**	**	**NR**	**85**	**150**	**≤100**	**0.005-98**
Duration of Use																
Leave-On	*18*	*17*	*NR*	*NS*	*NR*	*NR*	*6*	*NS*	#	*9*	**	*NR*	*74*	*131*	**	*0.005-98*
Rinse Off	*124*	*124*	*0.03-14*	*NS*	*NR*	*NR*	*10*	*NS*	#	*1*	**	*NR*	*11*	*19*	**	*0.005-5*
Exposure Type				***NS***				***NS***								
Eye Area	1	1	NR	NS	NR	NR	NR	NS	#	NR	**	NR	2	9	**	0.1
Possible Ingestion	NR	NR	NR	NS	NR	NR	NR	NS	#	NR	**	NR	NR	NR	**	14
Inhalation	NR	NR	NR	NS	NR	NR	NR	NS	#	NR	**	NR	NR	2	**	NR
Dermal Contact	140	140	0.04-14	NS	NR	NR	6-10	NS	#	10	**	NR	83	147	**	0.005-98
Deodorant (underarm)	NR	NR	NR	NS	NR	NR	NR	NS	#	NR	**	NR	NR	NR	**	NR
Hair - Non-Coloring	2	1	0.03-0.3	NS	NR	NR	NR	NS	#	NR	**	NR	1	2	**	NR
Hair-Coloring	NR	NR	NR	NS	NR	NR	NR	NS	#	NR	**	NR	NR	NR	**	NR
Nail	NR	NR	NR	NS	NR	NR	NR	NS	#	NR	**	NR	1	1	**	NR
Mucous Membrane	1	101	0.04-2	NS	NR	NR	NR	NS	#	1	**	NR	4	1	**	NR
Bath Products	93	NR	0.04-14	NS	NR	NR	NR	NS	#	NR	**	NR	2	2	**	NR
Baby Products	1	1	NR	NS	NR	NR	NR	NS	#	NR	**	NR	NR	1	**	NR

	Elaeis Guineensis (Palm) Oil				Elaeis Guineensis (Palm) Kernel Oil				Hydrogenated Palm Kernel Oil				Hydrogenated Palm Oil			
data year	*1997*	*2010*	*1997*	*2010*	*1997*	*2010*	*1997*	*2010*	*1997*	*2010*	*1997*	*2010*	*1997*	*2010*	*1997*	*2010*
Totals	**36**	**272**	**	**0.002-48**	**11**	**77**	**	**0.05-23**	**29**	**47**	**	**0.4-13**	**13**	**152**	**	**0.2-30**
Duration of Use																
Leave-On	*28*	*171*	**	*0.008-13*	*9*	*60*	**	*0.8-3*	*27*	*45*	**	*0.4-13*	*13*	*134*	**	*0.2-30*
Rinse-Off	*8*	*101*	**	*0.002-48*	*2*	*17*	**	*0.05-23*	*2*	*2*	**	*0.6-2*	*NR*	*18*	**	*2*
Exposure Type																
Eye Area	NR	12	**	0.04-2	NR	10	**	0.8	5	2	**	2-10	1	61	**	0.2-30
Possible Ingestion	NR	11	**	2	NR	6	**	NR	2	5	**	3-13	3	12	**	2-30
Inhalation	1	3	**	NR	NR	NR	**	NR	NR	1	**	NR	NR	NR	**	1
Dermal Contact	36	229	**	0.002-48	11	71	**	0.05-2	24	47	**	0.4-13	12	123	**	0.4-30
Deodorant (underarm)	NR	NR	**	NR	NR	NR	**	NR	NR	NR	**	NR	NR	NR	**	NR
Hair - Non-Coloring	NR	43	**	2-34	NR	6	**	0.9-23	NR	NR	**	NR	NR	NR	**	NR
Hair-Coloring	NR	NR	**	NR	NR	NR	**	NR	NR	NR	**	NR	NR	NR	**	NR
Nail	NR	NR	**	NR	NR	NR	**	3	NR	NR	**	NR	NR	NR	**	NR
Mucous Membrane	7	68	**	0.002-48	NR	10	**	0.05	2	2	**	0.9-2	NR	17	**	2
Bath Products	NR	NR	**	NR	NR	1	**	NR	NR	NR	**	NR	NR	NR	**	NR
Baby Products	1	2	**	NR	NR	NR	**	NR	NR	NR	**	NR	NR	NR	**	NR

Table 5b. Current and historical frequency and concentration of use according to duration and type of exposure - previously reviewed ingredients (continued)

	# of Uses		Conc. of Use (%)		# of Uses		Conc. of Use (%)		# of Uses		Conc. of Use (%)		# of Uses		Conc. of Use (%)	
	Gossypium Herbaceum (Cotton) Seed Oil				Hydrogenated Cottonseed Oil				Oryza Sativa (Rice) Bran Oil				Oryza Sativa (Rice) Germ Oil			
data year	*1998*	*2010*	*1998*	*2010*	*1998*	*2010*	*1998*	*2010*	*2002*	*2010*	*2000-2003*	*2010*	*2002*	*2010*	*2000-2003*	*2010*
Totals	**4**	**83**		**0.004-32**	**272**	**362**	**	**0.001-24**	**39**	**371**	**0.1-39**	**0.0003-78**	**6**	**34**	**0.1**	**0.003-3**
Duration of Use																
Leave-On	*1*	*68*		*0.08-32*	*272*	*358*	**	*0.001-24*	*32*	*267*	*0.1-8*	*0.0003-78*	*5*	*29*	*0.1*	*0.003-3*
Rinse Off	*3*	*15*	**	*0.004-29*	*NR*	*4*	**	*0.01-0.1*	*7*	*104*	*0.2-39*	*0.005-6*	*1*	*5*	*NR*	*0.003-3*
Exposure Type																
Eye Area	NR	4		0.1-11	116	155	**	0.5-24	NR	5	0.1-1	0.5-0.8	NR	2	NR	0.01-1
Possible Ingestion	NR	9	**	0.2-1	151	NR	**	8-12	NR	17	0.1-1	0.1-8	NR	4	NR	0.1-3
Inhalation	NR	12	**	0.2	NR	NR	**	NR	NR	11	NR	0.1	NR	NR	NR	NR
Dermal Contact	4	78	**	0.004-29	156	356	**	0.001-24	36	321	0.1-39	0.0003-27	6	32	0.1	0.003-3
Deodorant (underarm)	NR	1	**	0.2	NR	NR	**	NR	NR	NR	NR	0.5	NR	NR	NR	0.003
Hair - Non-Coloring	NR	2	**	NR	NR	4	**	0.01-0.1	3	42	0.3	0.005-0.5	NR	NR	NR	NR
Hair-Coloring	NR	NR	**	NR	NR	NR	**	NR	NR	NR	NR	0.3	NR	NR	NR	NR
Nail	NR	1	**	0.5-32	NR	NR	**	NR	2	5	NR	0.02-78	NR	NR	NR	NR
Mucous Membrane	NR	7	**	0.004-0.01	NR	NR	**	NR	NR	48	1	0.0006-6	NR	1	NR	0.003-0.005
Bath Products	NR	NR	**	NR	NR	NR	**	NR	1	17	1-39	0.2	NR	1	NR	0.5
Baby Products	NR	NR	**	NR	NR	8	**	NR	NR	1	NR	NR	NR	NR	NR	NR

	Persea Gratissima (Avocado) Oil				Prunus Amygalus Dulcis (Sweet Almond) Oil				Sesamum Indicum (Sesame) Seed Oil				Sesamum Indicum (Sesame) Oil Unsaponifiables			
data year	*2001*	*2010*	*2001*	*2010*	*2002*	*2010*	*2002*	*2010*	*2009*	*2010*	*2008*	*2010*	*2009*	*2010*	*2008*	*2010*
Totals	**188**	**883**	**0.001-23**	**0.0001-98**	**375**	**1127**	**0.004-76**	**0.0001-77**	**402**	**480**	**0.0001-73**	**NS**	**6**	**17**	**0.01-0.03**	**NS**
Duration of Use																
Leave-On	*40*	*657*	*0.001-23*	*0.0005-98*	*302*	*791*	*0.004-76*	*0.001-77*	*313*	*374*	*0.0001-73*	*NS*	*NR*	*17*	*0.01-0.03*	*NS*
Rinse-Off	*148*	*226*	*0.1-5*	*0.0001-15*	*73*	*336*	*0.01-2*	*0.0001-43*	*89*	*106*	*0.001-68*	*NS*	*NR*	*NR*	*NR*	*NS*
Exposure Type																
Eye Area	8	24	0.1-3	0.05-2	6	28	0.4	0.1-22	11	14	0.0008-10	NS	NR	NR	0.01	NS
Possible Ingestion	29	60	0.7-21	0.05-26	3	55	0.5	0.1-19	57	52	0.1-16	NS	NR	11	0.03	NS
Inhalation	2	11	0.02-3	0.01-8	3	18	1-3	0.5-39	5	5	2	NS	NR	NR	NR	NS
Dermal Contact	165	685	0.001-23	0.0005--98	323	986	0.04-11	0.001-46	346	414	0.0008-73	NS	6	17	0.01-0.03	NS
Deodorant (underarm)	NR	NR	NR	0.1	NR	2	0.004	0.02-1	NR	NR	NR	NS	NR	NR	NR	NS
Hair - Non-Coloring	11	189	0.002-3	0.0001-41	46	116	0.3-3	0.001-19	50	59	0.0001-30[a]	NS	NR	NR	NR	NS
Hair-Coloring	8	NR	NR	0.3	2	2	0.1	0.02	NR	NR	0.03-0.8[b]	NS	NR	NR	NR	NS
Nail	4	7	0.4-19	0.001-34	4	13	1-76	0.001-77	6	7	≤1-10	NS	NR	NR	NR	NS
Mucous Membrane	NR	43	0.1-5	0.002-3	19	93	0.5	<0.1-23	4	28	NR	NS	NR	NR	NR	NS
Bath Products	5	25	0.1-5	0.6-6	10	41	0.01-0.1	1-43	27	5	0.09-68	NS	NR	NR	NR	NS

Baby Products	NR	9	NR	NR	7	14	NR	2-3	1	3	6	NS	NR	NR	NR	NS

Table 5b. Current amd historical frequency and concentration of use according to duration and type of exposure - previously reviewed ingredients (continued)

	# of Uses		*Conc. of Use (%)*		*# of Uses*		*Conc. of Use (%)*		*# of Uses*		*Conc. of Use (%)*		*# of Uses*		*Conc. of Use (%)*	
	Triticum Vulgare (Wheat) Germ Oil				**Zea Mays (Corn) Oil**				**Zea Mays (Corn) Oil Unsaponifiables**				**Zea Mays (Corn) Germ Oil**			
data year	*2001*	*2010*	*2001*	*2010*	*2007*	*2010*	*2006*	*2010*	*2007*	*2010*	*2006*	*2010*	*2007*	*2010*	*2006*	*2010*
Totals	**303**	**527**	**0.00002-18**	**0.0001-28**	**498**	**598**	**0.00003-14**	**NS**	**7**	**1**	**NR**	**NS**	**37**	**53**	**0.2-25**	**NS**
Duration of Use																
Leave-On	*80*	*373*	*0.00002-18*	*0.0001-28*	*241*	*361*	*0.00003-14*	*NS*	*6*	*1*	*NR*	*NS*	*25*	*34*	*3-25*	*NS*
Rinse Off	*223*	*154*	*0.00002-5*	*0.001-2*	*257*	*237*	*0.001-0.07*	*NS*	*1*	*NR*	*NR*	*NS*	*12*	*19*	*0.2-3*	*NS*
Exposure Type																
Eye Area	9	12	0.00004-3	0.0001-0.5	39	35	0.0008-0.2	NS	NR	NR	NR	NS	NR	NR	NR	NS
Possible Ingestion	33	29	0.1-3	0.3-5	29	30	0.003-10	NS	NR	NR	NR	NS	NR	NR	NR	NS
Inhalation	2	7	0.0002-0.01	0.0001-0.0005	1	1	0.001-0.1	NS	NR	NR	NR	NS	NR	NR	NR	NS
Dermal Contact	220	360	0.00002-18	0.0005-23	276	371	0.00003-14	NS	7	1	NR	NS	31	50	3-25	NS
Deodorant (underarm)	NR	NR	0.02	NR	1	4	NR	NS	NR	NR	NR	NS	NR	NR	NR	NS
Hair - Non-Coloring	63	142	0.0001-2	0.0001-<1	38	40	0.0001-0.02	NS	NR	NR	NR	NS	4	3	0.2	NS
Hair-Coloring	12	20	0.1	0.01-0.2	182	183	0.004-0.007	NS	NR	NR	NR	NS	NR	NR	NR	NS
Nail	4	2	0.1-4	0.1-28	1	3	0.001-5	NS	NR	NR	NR	NS	NR	NR	NR	NS
Mucous Membrane	3	22	0.02-1	0.01-0.5	2	2	0.004-0.01	NS	NR	NR	NR	NS	4	3	3	NS
Bath Products	1	2	0.001-2	0.5	NR	NR	0.001-0.01	NS	NR	NR	NR	NS	3	4	NR	NS
Baby Products	1	9	0.5	NR	8	8	0.004	NS	NR	NR	NR	NS	2	4	NR	NS

*Note - Because each ingredient may be used in cosmetics with multiple exposure types, the sum of all exposure types my not equal the sum of total uses.

NR - not reported to the VCRP or the Council

NS - not surveyed; ingredients that were recently reviewed will not be resurveyed

** concentration of use data were not given in the original report

- was not distinguished whether C. Americana or C. Avellana was reported; arbitrarily reported under C. Avellana (Hazel) Seed Oil for this table

[a] 15% after dilution.

[b] 0.4 after dilution.

Table 5c. Ingredients with no reported use concentrations or uses.

Adansonia Digitata Seed Oil
Aleurites Moluccanus Bakoly Seed Oil
Amaranthus Hypochondriacus Seed Oil
Arctium Lappa Seed Oil
Babassu Acid
Bassia Butyracea Seed Butter
Brassica Campestris (Rapeseed) Oil Unsaponifiables
Brassica Napus Seed Oil
Brassica Oleracea Acephala Seed Oil
Canarium Indicum Seed Oil
Carya Illinoensis (Pecan) Seed Oil
Citrus Aurantifolia (Lime) Seed Oil
Citrus Aurantifolia (Lime) Seed Oil Unsaponifiables
Citrus Aurantium Dulcis (Orange) Seed Oil
Citrus Aurantium Dulcis (Orange) Seed Oil Unsaponifiables
Citrus Grandis (Grapefruit) Seed Oil Unsaponifiables
Citrus Limon (Lemon) Seed Oil
Cocos Nucifera (Coconut) Seed Butter
Coix Lacryma-Jobi (Job's Tears) Seed Oil
Corn Acid
Cottonseed Acid
Cynara Cardunculus Seed Oil
Elaeis (Palm) Oil
Elaeis Guineensis (Palm) Butter
Fragaria Ananassa (Strawberry) Seed Oil
Fragaria Chiloensis (Strawberry) Seed Oil
Fragaria Vesca (Strawberry) Seed Oil
Fragaria Virginiana (Strawberry) Seed Oil
Guizotia Abyssinica Seed Oil
Hippophae Rhamnoides Seed Oil
Hydrogenated Adansonia Digitata Seed Oil
Hydrogenated Apricot Kernel Oil Unsaponifiables
Hydrogenated Argania Spinosa Kernel Oil
Hydrogenated Black Currant Seed Oil
Hydrogenated Camelina Sativa Seed Oil
Hydrogenated Cranberry Seed Oil
Hydrogenated Grapefruit Seed Oil
Hydrogenated Grapefruit Seed Oil Unsaponifiables
Hydrogenated Hazelnut Oil
Hydrogenated Kukui Nut Oil
Hydrogenated Lime Seed Oil
Hydrogenated Lime Seed Oil Unsaponifiables
Hydrogenated Macadamia Seed Oil
Hydrogenated Meadowfoam Seed Oil
Hydrogenated Orange Seed Oil
Hydrogenated Orange Seed Oil Unsaponifiables
Hydrogenated Palm Acid
Hydrogenated Passiflora Edulis Seed Oil
Hydrogenated Peach Kernel Oil
Hydrogenated Pistachio Seed Oil
Hydrogenated Pumpkin Seed Oil
Hydrogenated Punica Granatum Seed Oil
Hydrogenated Raspberry Seed Oil
Hydrogenated Rice Bran Oil
Hydrogenated Rosa Canina Fruit Oil
Hydrogenated Safflower Seed Oil
Hydrogenated Sesame Seed Oil
Hydrogenated Sweet Almond Oil Unsaponifiables
Hydrogenated Wheat Germ Oil
Hydrogenated Wheat Germ Oil Unsaponifiables
Lupinus Albus Oil Unsaponifiables
Morinda Citrifolia Seed Oil
Olea Europaea (Olive) Husk Oil
Olive Acid
Oryza Sativa (Rice) Seed Oil
Peanut Acid
Potassium Babassuate
Potassium Cornate
Potassium Hydrogenated Cocoate
Potassium Hydrogenated Palmate
Potassium Peanutate
Potassium Rapeseedate
Potassium Safflowerate
Potassium Soyate
Prunus Amygdalus Dulcis (Sweet Almond) Oil Unsaponifiables
Prunus Armeniaca (Apricot) Kernel Oil Unsaponifiables
Rapeseed Acid
Ribes Rubrum (Currant) Seed Oil
Rice Bran Acid
Safflower Acid
Sesamum Indicum (Sesame) Seed Butter
Sodium Cocoa Butterate
Sodium Hydrogenated Cocoate
Sodium Hydrogenated Palmate
Sodium Macadamiaseedate
Sodium Peanutate
Sodium Rapeseedate
Sodium Safflowerate
Sodium Sesameseedate
Sodium Soyate
Sodium Theobroma Grandiflorum Seedate
Soy Acid
Sunflower Seed Acid
Torreya Nucifera Seed Oil
Triticum Aestivum (Wheat) Germ Oil
Triticum Vulgare (Wheat) Germ Oil Unsaponifiables
Vaccinium Corymbosum (Blueberry) Seed Oil

Table 6. Non-cosmetic uses of oils.[6,137,200-205]

Oil	Use
Aleurities Moluccana Seed Oil [Kukui]	wood preservative, varnishes, paint oil, illumination, soap making, waterproofing paper, rubber substitute, insulating material
Anacardium Occidentale (Cashew) Seed Oil	folk remedies
Arachis Hypogaea (Peanut) Oil	pharmaceutical, soap making, lubricants, emulsions for insect control, diesel engine fuel
Brassica Napus Seed Oil [Rapeseed]/Canola Oil	rubber additive · lubricants · fat liquoring of leather · varnishes and lacquers · textile chemicals · detergent additives · plasticizers · weed control · medicinal procedures
Butyrospermum Parkii (Shea) Oil	illumination
Camelina Sativa Seed Oil [False Flax]	drying oil · manufacturing of varnishes and paints
Citrullus Lanatus (Watermelon) Seed Oil	illumination
Cocos Nucifera (Coconut) Oil	lubricants, hydraulic fluid, paints, synthetic rubber, plastics, illumination
Elais Guineensis (Palm) Oil	crayon and candle manufacturing · tin plate industry
Elais Guineensis (Palm) Kernel Oil	detergent production · pharmaceutical · crayon and candle manufacturing · tin plate industry
Garcinia Indica Seed Butter [Kokum]	candle and soap making, sizing of cotton yarn, pharmaceutical
Guizotia Abyssinica Seed Oil [Niger/Ramtil]	paint · lubricant · pharmaceutical
Helianthus Annuus (Sunflower) Seed Oil	manufacturing of lacquers, copolymers, polyester films, modified resins, plasticizers, alkyld resins, other similar products
Juglans Regia (Walnut) Seed Oil	paints, soap making
Linum Usitatissimum (Linseed) Seed Oil	manufacturing of linoleum, cloth oil, printing and lithographic inks, core oils, linings, packings, oil-modified alkyd resins, caulking compounds, putties, leather-finishing compounds, lubricants, greases, polishes, pyrotechnic compositions · pigment binder in petrochemicals · concrete protector · stabilizer/plasticizer for vinyl plastics · industrial stains · jute textiles · drying oil in paints and varnishes
Mangifera Indica (Mango) Seed Butter	substitute for cocoa butter
Olea Europaea (Olive) Fruit Oil	textile industry · pharmaceutical
Orbignya Cohune Seed Oil	manufacturing of soaps, candles, and nightlights · cotton dyeing · ointment base · substitute for cocoa butter in food
Perilla Ocymoides Seed Oil [Perilla]	substitute for linseed oil in the manufacture of paints, varnishes, linoleum, oilclothes, and printing inks
Prunus Amygdalus Dulcis (Sweet Almond) Oil	pharmaceutical, energy source
Prunus Armeniaca (Apricot) Kernel Oil	pharmaceutical
Theobroma Cacao (Cocoa) Seed Butter	pharmaceutical
Vitis Vinifera (Grape) Seed Oil	substitute for linseed oil in the manufacture of paints, and varnishes

Table 7. Clinical irritation and sensitization studies on oils.

Ingredient and Concentration	Subjects Completed	Method	Results	Reference
		Adansonia Digitata Seed Oil		
0.01% Adansonia Digitata Seed Oil in a lip product	106	HRIPT with 0.2 g test material, semi-occluded	not a dermal irritant or sensitizer	206
100% Adansonia Digitata Seed Oil	107	HRIPT with 0.02-0.05 ml test material, semi-occluded	not a dermal irritant or sensitizer	207
		Aleurites Moluccana Seed Oil		
0.005% Aleurites Moluccana Seed Oil in scalp conditioner/hair wax	104	HRIPT; occlusive; applied neat	not a dermal irritant or sensitizer	208
		Arachis Hypogaea (Peanut) Oil		
dermatologic product containing 0.01% fluocinolone and refined Arachis Hypogaia (Peanut) Oil	peanut-sensitive subjects; 8 children, 6 adults	skin prick test with peanut extracts, a soln, of 50% glycerin (negative control), a solution of 1.8 mg/ml histamine phosphate in 50% glycerin (positive control), the complete test product, vehicle only (without fluocinolone), and refined Arachis Hypogaea (Peanut) Oil	1 child had a trace positive reaction	
		patch test with product, vehicle only, and refined Arachis Hypogaea (Peanut) Oil	no reactions	209
		Argania Spinosa Kernel Oil		
5% Argania Spinosa Kernel Oil in a face serum	108	primary cutaneous irritation	no primary irritation	210
5% Argania Spinosa Kernel Oil in a face serum	108	HRIPT; occlusive; applied neat	not an irritant or a sensitizer	210
10% Argania Spinosa Kernel Oil in a skin salve	209	HRIPT; occlusive applied neat	not a sensitizer	211
10% Argania Spinosa Kernel Oil in a skin salve	51	4-wk use test; applied to lips, hands/nails, elbows, knees, feet/heels	did not elicit significant dermal irritation or dryness; 2 subjects had level 1(mild, very slight erythema on the lips, and 5 had level 1 erythema on the elbows, lips, or knees; 15 subjects reported subjective irritation	212
		Astrocaryum Murumuru		
1% Astrocaryum Murumuru Seed Butter in a lipstick	97	HRIPT with 150 mg test material, semi-occluded	not a dermal irritant or sensitizer	213
4% Astrocaryum Murumuru Seed Butter in a lipstick	108	HRIPT, occluded	not a dermal irritant or sensitizer	214
4% Astrocaryum Murumuru Seed Butter in a lipstick	108	HRIPT, occluded	not a dermal irritant or sensitizer	215
4% Astrocaryum Murumuru Seed Butter in a lipstick	108	HRIPT, occluded	not a dermal irritant or sensitizer	216
4% Astrocaryum Murumuru Seed Butter in a lipstick	106	HRIPT, occluded	not a dermal irritant or sensitizer	217
4% Astrocaryum Murumuru Seed Butter in a lipstick	106	HRIPT, occluded	not a dermal irritant or sensitizer	218
4% Astrocaryum Murumuru Seed Butter in a lipstick	108	HRIPT, occluded	not a dermal irritant or sensitizer	219
		Avena Sativa (Oat) Kernel Oil		
3% Avena Sativa (Oat) Kernel Oil in a body and hand formulation	100	HRIPT with 0.2 ml, occluded	not a dermal irritant or sensitizer	220

Table 7. Clinical irritation and sensitization studies on oils.

Ingredient and Concentration	Subjects Completed	Method	Results	Reference
		Borago Officinalis Seed Oil		
1% Borago Officinalis Seed Oil in a body and hand formulation	213	HRIPT with 0.2 g, occluded	not a dermal irritant or sensitizer	221
2% Borago Officinalis Seed Oil in a face serum	108	primary cutaneous irritation	no primary irritation	210
2% Borago Officinalis Seed Oil in a face serum	108	HRIPT; occlusive; applied neat	not an irritant or a sensitizer	210
		Brassica Campestris (Rapeseed) Oil		
5% Hydrogenated Rapeseed Oil in a baby oil	105	HRIPT with 0.2 ml, semi-occluded	not a dermal irritant or sensitizer	222
		Brassica Oleracea Italica (Broccoli) Seed Oil		
0.5% Brassica Oleracea Italica (Broccoli) Seed Oil in a hair conditioner	102	HRIPT with 150 µl of test material, 10% dilution, semi-occluded	not a dermal irritant or sensitizer	223
		Butyrospermum Parkii (Shea) Butter		
9 lipids, including Butyrospermum Parkii (Shea) Butter and fractions of fractions of unsaponifiable lipids from Butyrospermum Parkii (Shea) Butter; the "liquid" sample was obtained from a supplier; the unsaponifiable fraction was obtained through low temperature crystallization of the supplied sample	21	single applications to normal skin and sodium lauryl sulfate (SLS)-irritated skin; right volar forearm was treated with 50 µl of each test material in 12 mm Finn chambers for 48 h; the left volar forearm was treated with 50 µl of 14% aq. SLS for 7 h, rinsed, dried, and then treated with 50 µl of each test material for 17 h; cutaneous blood flow (CBF) and transepidermal water loss (TEWL) were measured	normal skin: barely perceptible erythema observed in a "small" number of subjects at 24 h after treatment with shea butter; no irritation to the shea unsaponifiable fraction; no sig. difference in CBF or TEWL SLS-treated skin: 2 subjects had a slight-and moderate reaction to the unsaponifiable fraction; no sig. difference in CBF or TEWL	224
0.1% Butyrospermum Parkii (Shea) Butter in a scalp conditioner	114	primary cutaneous irritation; formulation diluted to 1%	no primary irritation	225
2% Butyrospermum Parkii (Shea) Butter in a cream	119	primary cutaneous irritation	no primary irritation	226
0.1% Butyrospermum Parkii (Shea) Butter in a scalp conditioner	110	HRIPT; occlusive; formulation diluted to 1%	not a dermal irritant or sensitizer	225
2% Butyrospermum Parkii (Shea) Butter in a cream	118 (irritation)/ 116 (sensitization)	HRIPT; occlusive	not a dermal irritant or sensitizer	226
4% Butyrospermum Parkii (Shea) Butter in a face cream	51	HRIPT with 20 µl test material, occluded	not a dermal irritant or sensitizer	227
4% Butyrospermum Parkii (Shea) Butter in an eye cream	108	HRIPT with 20 µl test material, occluded	not a dermal irritant or sensitizer	228
23.5% Butyrospermum Parkii (Shea) Butter in a lip gloss	104	HRIPT	not a dermal irritant or sensitizer	229
23.7% Butyrospermum Parkii (Shea) Butter in a lip gloss	104	HRIPT	irritation on induction days 5-9 in one subject; no sensitization	230
24.1% Butyrospermum Parkii (Shea) Butter in a lip wax	113	HRIPT	not a dermal irritant or sensitizer	231
24.1% Butyrospermum Parkii (Shea) Butter in a lip wax	2 runs	Episkin	average viability 67.3% - no irritation potential	232
24.7% Butyrospermum Parkii (Shea) Butter in a lip gloss	40	28-day use study, 2-6 times /day	1 subject with desquamation	233
45% Butyrospermum Parkii (Shea) Butter in a body/hand massage	109[a]	HRIPT	not a dermal irritant or sensitizer	234

Table 7. Clinical irritation and sensitization studies on oils.

Ingredient and Concentration	Subjects Completed	Method	Results	Reference
Butyrospermum Parkii (Shea) Butter				
45% Butyrospermum Parkii (Shea) Butter in a body/hand massage	109[a]	HRIPT	not a dermal irritant or sensitizer	235
45% Butyrospermum Parkii (Shea) Butter in a body/hand massage	109[a]	HRIPT	not a dermal irritant or sensitizer	236
45% Butyrospermum Parkii (Shea) Butter in a body/hand massage	109[a]	HRIPT	not a dermal irritant or sensitizer	237
45% Butyrospermum Parkii (Shea) Butter in a body/hand massage	31	2-week use study, 2 time per day	no erythema, edema, or dryness	238
60% Butyrospermum Parkii (Shea) Butter in a cuticle cream	111	HRIPT	not a dermal irritant or sensitizer	239
Camelina Sativa Seed Oil				
0.25% Camelina Sativa Seed Oil in a body powder	204	HRIPT with 0.1 g, semi-occluded	not a dermal sensitizer	240
7% Camelina Sativa Seed Oil in an oil treatment	103	HRIPT with 200 µl test material, semi-occluded	Grade 1 (mild erythema) reactions in 4 subjects for 1 or 2 patches in the induction phase, grade 1 (mild erythema in different subjects at the 48 h challenge reading. Study concluded test material was not a dermal irritant or sensitizer.	241
Camellia Sinensis Seed Oil				
0.0985% Camellia Sinensis Seed Oil in a lipstick	108	HRIPT with 0.2 g, occluded	not a dermal irritant or sensitizer	242
0.0985% Camellia Sinensis Seed Oil in a lipstick	108	HRIPT with 0.2 g, occluded	not a dermal irritant or sensitizer	243
Canola Oil				
74.7% Canola Oil in a body oil	101	HRIPT with 150 µl test material, semi-occluded	not a dermal irritant or sensitizer	244
Carthamus Tinctorius (Safflower) Oil				
Cosmetic formulations containing 3-5% Carthamus Tinctorius (Safflower) Seed Oil were not irritating to humans in occlusive patch tests and were not primary irritants or sensitizers in repeated insult patch tests				32
5% Carthamus Tinctorius (Safflower) Seed Oil in a cleansing oil rinse-off	214	HRIPT with 0.2 ml of a 10% v/v aqueous solution, semi-occluded	3 subjects had a "?" reaction following a patch during the induction and 1 subject had definite erythema with no edema or damage to the epidermis (+D) following the 7th patch. No reactions were observed at a new test site. No other reactions were observed. Study concluded test material was not a dermal sensitizer.	245
30% Carthamus Tinctorius (Safflower) Seed Oil in a massage oil	107	HRIPT with 0.2 ml test material, semi-occluded	1 subject had slight erythema following the 7th patch that did not reoccur, no other reactions observed. Not a dermal irritant or sensitizer.	246

Table 7. Clinical irritation and sensitization studies on oils.

Ingredient and Concentration	Subjects Completed	Method	Results	Reference
Caryocar Brasiliense Fruit Oil				
0.1% Caryocar Brasiliense Fruit Oil in a lipstick	100	HRIPT with 200 mg test material, semi-occluded	not a dermal irritant or sensitizer	247
Chenopodium Quinoa Seed Oil				
1% Chenopodium Quinoa Seed Oil in a UV SPF cream	105	HRIPT with 0.02 ml test material, occluded	"An acceptable level of irritation" was observed in the induction phase consisting of grade 1 (mild erythema) in 39 subjects, with one additional subject exhibiting a grade 2 (moderate erythema) reaction. No evidence of skin sensitization was observed.	248
1% Chenopodium Quinoa Seed Oil in a UV SPF cream	102	HRIPT with 0.02 ml test material, occluded	"An acceptable level of irritation" was observed in the induction phase, with 54% of the subjects exhibiting a grade 1 (mild erythema) reaction and 3% of the subjects exhibiting a grade 2 (moderate erythema) reaction. One subject had a strong reaction to the 3rd induction patch and discontinued the induction phase after the 6th application. At challenge, the subject had only papules at 96 h. Due to reactions to other materials tested at the same time, it could not be determined if the test material was the causative agent. No evidence of skin sensitization was observed in the remaining subjects.	249
Citrullus Lanatus (Watermelon) Seed Oil				
2% Citrullus Lanatus (Watermelon) Seed Oil in a facial oil	105	HRIPT, semi-occluded	not a dermal irritant or sensitizer	250
Cocos Nucifera (Coconut) Fruit Oil				
An RIPT was performed using 103 subjects with a tanning butter containing 2.5% Cocos Nucifera (Coconut) Oil no erythematous reactions were seen at challenge; A bar soap containing 13% Cocos Nucifera (Coconut) Oil produced very mild irritation when tested as a 1% aq. solution on 106 subjects, and it was minimally to mildly irritating in a soap chamber test with a 8% aq. solution; the soap produced no unusual irritation response in a 2-wk normal use test; undiluted Cocos Nucifera (Coconut) Oil was not an allergen in 12 subjects				
Four lipstick formulations containing 10% hydrogenated coconut oil were tested with a single 48-h application on 204 females; there was no evidence of primary irritation and no indication of sensitization on retests performed 14 d later				
In a test using 40 healthy subjects and 480 patients with active skin disease, 5% aq. potassium cocoate produced 5 positive responses				42
0.15% Cocos Nucifera (Coconut) Oil in a scalp conditioner/hair wax	104	HRIPT; occlusive; applied neat	not a dermal irritant or sensitizer	208

Table 7. Clinical irritation and sensitization studies on oils.

Ingredient and Concentration	Subjects Completed	Method	Results	Reference
31% Cocos Nucifera (Coconut) Oil in a lip balm	222	HRIPT with 0.2 g test material, occluded	2 subjects had low-level, transient (±) reactions during the induction, no other reactions were observed. Study concluded that test material was not a dermal sensitizer.	251
		Hazel Seed Oil		
5% Corylus Avellana (Hazel) Seed Oil in a massage oil	107	HRIPT with 0.2 ml test material, semi-occluded	1 subject had slight erythema following the 7th patch that did not reoccur, no other reactions observed. Not a dermal irritant or sensitizer.	246
A patch testing reference book by de Groot noted that the published literature does not contain recommended test concentrations concerning Hazel Seed Oil. To serve as a guide to the reader, de Groot reported that an unpublished (and at the time, ongoing) study found no irritant reaction in 1 to 20 patients suffering from or suspected to suffer from cosmetic product contact allergy who had been patch tested with 30% Hazel Seed Oil in petrolatum				40
		Crambe Abyssinica Seed Oil		
5% Crambe Abyssinica Seed Oil in a face and neck product	54	HRIPT; semi-occluded, undiluted	not a dermal irritant or sensitizer	252
		Elaeis Guineensis (Palm) Oil		
Elaeis Guineensis (Palm) Oil, 15% in petrolatum or cosmetic formulations containing 1.0-2.0%, was not an irritant or sensitizer in clinical studies Bar soap flakes, tested at dilutions that contained ≤ 2.13% palm kernel oil, were not irritating or sensitizing				26
15.7% Sodium Palm Kernelate in a soap	42	28-day use test	good acceptability for use	253
61.6% Sodium Palmate in a soap	42	28-day use test	good acceptability for use	253
		Euterpe Oleracea Fruit Oil		
0.5% Euterpe Oleracea Fruit Oil in an eye treatment	104	HRIPT with 150 µl test material, semi-occluded	not a dermal irritant or sensitizer	254
		Glycine Soja (Soybean) Oil		
0.19% Glycine Soja (Soybean) Unsaponifiables in a face and neck product	50	HRIPT, occluded	not a dermal irritant or sensitizer	255
39% Hydrogenated Soybean Oil in a lipstick	108	HRIPT, occluded	not a dermal irritant or sensitizer	256
		Gossypium Herbaceum (Cotton) Seed Oil		
Patients that were hypersensitive to cottonseed proteins were not sensitive to cottonseed oil in a skin prick test				27
3.6% Hydrogenated Cottonseed Oil in a lip balm	222	HRIPT with 0.2 g test material, occluded	2 subjects had low-level, transient (±) reactions during the induction, no other reactions were observed. Study concluded that test material was not a dermal sensitizer.	251
In a clinical patch test, the irritation potential of a cosmetic formulation containing 3.4% hydrogenated cottonseed oil was mildly low, and the severity of reaction to 10.4% hydrogenated cottonseed oil was acceptably low in a use study. Cosmetic formulations containing 10.6-20.86% hydrogenated cottonseed oil were not irritating or sensitizing.				27
		Helianthus Annuus (Sunflower) Seed Oil		
6% Helianthus Annuus (Sunflower) Seed Oil in a skin cream	108	primary cutaneous irritation	no primary irritation	257
20% Helianthus Annuus (Sunflower) Seed Oil in a face serum	108	primary cutaneous irritation	no primary irritation	210

Table 7. Clinical irritation and sensitization studies on oils.

Ingredient and Concentration	Subjects Completed	Method	Results	Reference
0.264% Helianthus Annuus (Sunflower) Seed Oil in a cream	57	HRIPT; Finn chambers, applied neat	not a dermal irritant or sensitizer	258
6% Helianthus Annuus (Sunflower) Seed Oil in a skin cream	106	HRIPT, occlusive	not a dermal irritant or sensitizer	257
		Helianthus Annuus (Sunflower) Seed Oil		
20% Helianthus Annuus (Sunflower) Seed Oil in a face serum	108	HRIPT; occlusive; applied neat	not an irritant or a sensitizer	210
1% Helianthus Annuus (Sunflower) Seed Oil in a soap	42	28-day use test	good acceptability for use	253
39.8% Helianthus Annuus (Sunflower) Seed Oil in a massage oil	107	HRIPT with 0.2 ml test material, semi-occluded	1 subject had slight erythema following the 7th patch that did not reoccur, no other reactions observed. Not a dermal irritant or sensitizer.	246
2% Helianthus Annuus (Sunflower) Seed Oil Unsaponifiables in a night product	100	HRIPT, semi-occluded	not a dermal irritant or sensitizer	255
2% Helianthus Annuus (Sunflower) Seed Oil Unsaponifiables in a face and neck product	100	HRIPT, semi-occluded	not a dermal irritant or sensitizer	255
		Irvingia Ganensis Kernel Butter		
0.31% Irvingia Ganensis Kernel Butter in a face and neck product	52	HRIPT, occluded	not a dermal irritant or sensitizer	255
		Limnanthes Alba (Meadowfoam) Seed Oil		
71.3% Limnanthes Alba (Meadowfoam) Seed Oil in a facial repair product	109	HRIPT, semi-occluded	7 subjects had ± on the first day of the induction only, no other reactions. Not a dermal irritant or sensitizer.	259
		Linum Usitatissimum (Linseed) Seed Oil		
9.4% Linum Usitatissimum (Linseed) Seed Oil in mascara	105	HRIPT with 0.2 g test material, semi-occluded	not a dermal irritant or sensitizer	260
		Macadamia Ternifolia Seed Oil		
0.5% Macadamia Ternifolia Seed Oil in a cleansing oil rinse-off	214	HRIPT with 0.2 ml of a 10% v/v aqueous solution, semi-occluded	3 subjects had a "?" reaction following a patch during the induction and 1 subject had definite erythema with no edema or damage to the epidermis (+D) following the 7th patch. No reactions were observed at a new test site. No other reactions were observed. Study concluded test material was not a dermal sensitizer.	245
30% Macadamia Ternifolia Seed Oil in a body and hand product	55	HRIPT; semi-occluded, undiluted	not a dermal irritant or sensitizer	252
		Mangifera Indica (Mango) Seed Oil		
2% Mangifera Indica (Mango) Seed Oil in a lipstick	100	HRIPT with 150 µl test material, semi-occluded	not a dermal irritant or sensitizer	261
3.87% Mangifera Indica (Mango) Seed Oil in an eyeliner	102	HRIPT with 0.2 g of test material, semi-occluded	not a dermal irritant or sensitizer	262

Table 7. Clinical irritation and sensitization studies on oils.

Ingredient and Concentration	Subjects Completed	Method	Results	Reference
1% Mangifera Indica (Mango) Seed Butter in a facial lotion	100	HRIPT with 200 µl test material, semi-occluded	not a dermal irritant or sensitizer	263
9% Mangifera Indica (Mango) Seed Butter in a body product	102	HRIPT with 0.2 g, semi-occluded	not a sensitizer	264
		Moringa Oleifera Seed Oil		
0.01% Moringa Oleifera Seed Oil in a cleansing oil rinse-off	214	HRIPT with 0.2 ml of a 10% v/v aqueous solution, semi-occluded	3 subjects had a "?" reaction following a patch during the induction and 1 subject had definite erythema with no edema or damage to the epidermis (+D) following the 7th patch. No reactions were observed at a new test site. No other reactions were observed. Study concluded test material was not a dermal sensitizer.	245
3% Moringa Pterygosperma Seed Oil in an eye treatment	104	HRIPT with 150 µl test material, semi-occluded	not a dermal irritant or sensitizer	265
		Oenothera Biennis (Evening Primrose) Oil		
1.99% Oenothera Biennis (Evening Primrose) Oil in a foundation	600	HRIPT, occluded	not a dermal irritant or sensitizer	266
		Olea Europaea (Olive) Fruit Oil		
0.7% Olea Europaea (Olive) Fruit Oil in a scalp conditioner	114	primary cutaneous irritation; formulation diluted to 1%	no primary irritation	225
0.1595% Olea Europaea (Olive) Fruit Oil in a scalp coditioner/hair wax	104	HRIPT; occlusive; applied neat	not a dermal irritant or sensitizer	208
0.7% Olea Europaea (Olive) Fruit Oil in a scalp conditioner	110	HRIPT; occlusive; formulation diluted to 1%	not a dermal irritant or sensitizer	225
1.6% Olea Europaea (Olive) Fruit Oil in a body lotion	110	HRIPT with 0.02 ml test material , occluded	1 subject had slight erythema following the 7th patch that did not reoccur, no other reactions observed. Not a dermal irritant or sensitizer.	267
10% Olea Europaea (Olive) Fruit Oil in a skin salve	209	HRIPT; occlusive applied neat	not a sensitizer	211
22% Olea Europaea (Olive) Fruit Oil in a body moisturizer	105	HRIPT, semi-occluded	not a dermal irritant or sensitizer	268
58.7% Olea Europaea (Olive) Fruit Oil in a conditioning hair oil	102	HRIPT with 0.2 ml, semi-occluded	not a dermal irritant or sensitizer	269
69.6% Olea Europaea (Olive) Fruit Oil in a foundation	209	HRIPT with 200 µl test material, occluded	not a dermal irritant or sensitizer	270
10% Olea Europaea (Olive) Oil in a skin salve	51	4-wk use test; applied to lips, hands/nails, elbows, knees, feet/heels	did not elicit significant dermal irritation or dryness; 2 subjects had level 1(mild, very slight erythema on the lips, and 5 had level 1 erythema on the elbows, lips, or knees; 15 subjects reported subjective irritation	212
2.5% Olea Europaea (Olive) Oil Unsaponfiables in a bath body mist	107	HRIPT with 150 µl test material, semi-occluded	not a dermal irritant or sensitizer	271

Table 7. Clinical irritation and sensitization studies on oils.

Ingredient and Concentration	Subjects Completed	Method	Results	Reference
12% Hydrogenated Olive Oil in a lipstick	108	HRIPT, occluded	not a dermal irritant or sensitizer	256
2% Hydrogenated Olive Oil Unsaponifiables in a face and neck product	50	HRIPT, occluded	not a dermal irritant or sensitizer	255
Olea Europaea (Olive) Fruit Oil				
5% Hydrogenated Olive Oil Unsaponifiables in a skin cleansing product	57	HRIPT, semi-occluded, 10% dilution of product	not a dermal irritant or sensitizer	255
17.64% Sodium Olivate in a body bar soap	107	HRIPT, semi-occluded	not a dermal irritant or sensitizer	272
Orbignya Oleifera Seed Oil				
3.79% Orbignya Oleifera Seed Oil in a cream cleanser	104	HRIPT with 0.2 ml of a 10% dilution of formulation, semi-occluded	not a dermal irritant or sensitizer	273
Oryza Sativa (Rice) Bran Oil				
Rice is generally regarded as hypoallergenic, although some case studies of allergic reactions to raw rice have been reported. In clinical testing, formulations containing 1.04-8.0% Oryza Sativa (Rice) Bran Oil were not irritating or sensitizing, and formulations containing 1.04% Oryza Sativa (Rice) Bran Oil were not photosensitizing. Hydrolyzed rice protein was not irritating to human subjects.				28
Persea Gratissima (Avocado) Oil				
Persea Gratissima (Avocado) Oil was not an irritant or sensitizer when human subjects were patch tested with cosmetic formulations containing up to 10.7% Persea Gratissima (Avocado) Oil or in patch tests using 100% Persea Gratissima (Avocado) Oil.				31
0.2% Persea Gratissima (Avocado) Oil in a scalp conditioner	114	primary cutaneous irritation; formulation diluted to 1%	no primary irritation	225
0.2% Persea Gratissima (Avocado) Oil in a scalp conditioner	110	HRIPT; occlusive; formulation diluted to 1%	not a dermal irritant or sensitizer	225
10% Persea Gratissima (Avocado) Oil in a skin salve	51	4-wk use test; applied to lips, hands/nails, elbows, knees, feet/heels	did not elicit significant dermal irritation or dryness; 2 subjects had level 1(mild, very slight erythema on the lips, and 5 had level 1 erythema on the elbows, lips, or knees; 15 subjects reported subjective irritation	212
Plukenetia Volubilis Seed Oil				
0.51% Plukenetia Volubilis Seed Oil in a lipstick	108	HRIPT; occlusive; applied neat	not an irritant or a sensitizer	274
Prunus Amygdalus (Sweet Almond) Oil				
Undiluted Prunus Amygdalus (Sweet Almond) Oil was non-irritating in a single insult patch tes with 101 subjects, and it was non-irritating and non-sensitizing in an HRIPT using 52 subjects. Cosmetic formulations containing 0.1-25% were practically non-irritating and non-sensitizing in HRIPTs performed with 6906 subjects. In the Lanman-Maibach 21-day Cumulative Irritancy Assay, a moisturizer containing 25% Prunus Amygdalus Dulcis (Sweet Almond) Oil had a total irritancy score of 14/630				69
7% Prunus Amygdalus Dulcis (Sweet Almond) Oil in an oil treatment	103	HRIPT with 200 µl test material, semi-occluded	Grade 1 (mild erythema) reactions in 4 subjects for 1 or 2 patches in the induction phase, grade 1 (mild erythema in different subjects at the 48 h challenge reading. Study concluded test material was not a dermal irritant or sensitizer.	241
10% Prunus Amygdalus Dulcis (Sweet Almond) Oil in a face serum	108	primary cutaneous irritation	no primary irritation	210

Table 7. Clinical irritation and sensitization studies on oils.

Ingredient and Concentration	Subjects Completed	Method	Results	Reference
10% Prunus Amygdalus Dulcis (Sweet Almond) Oil in a face serum	108	HRIPT; occlusive; applied neat	not an irritant or a sensitizer	210
10% Prunus Amygdalus Dulcis (Sweet Almond) Oil in a skin salve	209	HRIPT; occlusive applied neat	not a sensitizer	211
Prunus Amygdalus (Sweet Almond) Oil				
10% Prunus Amygdalus Dulcis (Sweet Almond) Oil in a skin salve	51	4-wk use test; applied to lips, hands/nails, elbows, knees, feet/heels	did not elicit significant dermal irritation or dryness; 2 subjects had level 1(mild, very slight erythema on the lips, and 5 had level 1 erythema on the elbows, lips, or knees; 15 subjects reported subjective irritation	212
15% Prunus Amygdalus Dulcis (Sweet Almond) Oil in a massage oil	107	HRIPT with 0.2 ml test material, semi-occluded	1 subject had slight erythema following the 7th patch that did not reoccur, no other reactions observed. Not a dermal irritant or sensitizer.	246
25% Prunus Amygdalus Dulcis (Sweet Almond) Oil in a lip balm	222	HRIPT with 0.2 g test material, occluded	2 subjects had low-level, transient (±) reactions during the induction, no other reactions were observed. Study concluded that test material was not a dermal sensitizer.	251
Prunus Armeniaca (Apricot) Kernel Oil				
2% Prunus Armeniara (Apricot) Kernel Oil in a face cream	51	HRIPT with 20 µl test material, occluded	not a dermal irritant or sensitizer	227
2% Prunus Armeniara (Apricot) Kernel Oil in an eye cream	108	HRIPT with 20 µl test material, occluded	not a dermal irritant or sensitizer	228
2.5% Prunus Armeniaca (Apricot) Kernel Oil in a cream	119	primary cutaneous irritation	no primary irritation	226
19.749% Prunus Armeniaca (Apricot) Kernel Oil in a face serum	108	primary cutaneous irritation	no primary irritation	210
0.005% Prunus Armeniaca (Apricot) Kernel Oil in a scalp conditioner/hair wax	104	HRIPT; occlusive; applied neat	not a dermal irritant or sensitizer	208
1% Prunus Armeniaca (Apricot) Kernel Oil in a cream	57	HRIPT; Finn chambers, applied neat	not a dermal irritant or sensitizer	258
2.5% Prunus Armeniaca (Apricot) Kernel Oil in a cream	118 (irritation)/ 116 (sensitization)	HRIPT; occlusive	not a dermal irritant or a sensitizer	226
19.749% Prunus Armeniaca (Apricot) Kernel Oil in a face serum	108	HRIPT; occlusive; applied neat	not an irritant or a sensitizer	210
Prunus Domestica Seed Oil				
0.04% Prunus Domestica Seed Oil in a preshave lotion	105	HRIPT with 0.2 ml, occluded	not a sensitizer	275
Prunus Persica (Peach) Kernel Oil				
24% Prunus Persica (Peach) Kernel Oil in a lip balm	222	HRIPT with 0.2 g test material, occluded	2 subjects had low-level, transient (±) reactions during the induction, no other reactions were observed. Study concluded that test material was not a dermal sensitizer.	251

Table 7. Clinical irritation and sensitization studies on oils.

Ingredient and Concentration	Subjects Completed	Method	Results	Reference
Ribes Nigrum (Black Currant) Seed Oil				
0.1% Ribes Nigrum (Black Currant) Oil in a scalp conditioner	114	primary cutaneous irritation; diluted to 1%	no primary irritation	225
Ribes Nigrum (Black Currant) Seed Oil				
0.25% Ribes Nigrum (Black Currant) Oil in a cream	119	primary cutaneous irritation	no primary irritation	226
0.1% Ribes Nigrum (Black Currant) Oil in a scalp conditioner	110	HRIPT; occlusive; diluted to 1%	not a dermal irritant or sensitizer	225
0.2% Ribes Nigrum (Black Currant) Seed Oil is an eye mask	228	HRIPT, occluded	4 subjects had "?" or "+" reaction during induction that were not considered clinically relevant, no other reactions observed. Not sensitizing	276
0.2% Ribes Nigrum (Black Currant) Oil in a skin cream	106	HRIPT, occlusive	not a dermal irritant or sensitizer	257
0.25% Ribes Nigrum (Black Currant) Oil in a cream	118 (irritation)/ 116 (sensitization)	HRIPT; occlusive	not a dermal irritant or a sensitizer	226
0.2% Ribes Nigrum (Black Currant) Seed Oil is an eye mask	195	4-week safety in-use study	No adverse reactions reported. Product considered suitable for sensitive skin.	277
Rosa Canina Fruit Oil				
0.39% Rosa Canina Fruit Oil in a skin cream	108	primary cutaneous irritation	no primary irritation	257
0.39% Rosa Canina Fruit Oil in a skin cream	106	HRIPT, occlusive	not a dermal irritant or sensitizer	257
Rubus Idaeus (Raspberry) Seed Oil				
5% Rubus Idaeus (Raspberry) Seed Oil in a face and neck product	102	HRIPT, occluded	not a dermal irritant or sensitizer	255
Sesamum Indicum (Sesame) Seed Oil				
In clinical testing, undiluted Sesamum Indicum (Sesame) Seed Oil was not irritating. Cosmetic formulations containing 8-14.3% Sesamum Indicum (Sesame) Seed Oil were non- to essentially non-irritating. Prophetic patch testing with formulations containing 10-11% Sesamum Indicum (Sesame) Seed Oil were not irritating with or without UV light. Patients with contact allergy to Sesamum Indicum (Sesame) Seed Oil were patch tested, and most had positive reactions to sesamol, sesamin, and sesamolin.				53
25% Sesamum Indicum (Sesame) Seed Oil in a face serum	108	primary cutaneous irritation	no primary irritation	210
8% Sesamum Indicum (Sesame) Seed Oil in a skin salve	209	HRIPT; occlusive applied neat	not a sensitizer	211
25% Sesamum Indicum (Sesame) Seed Oil in a face serum	108	HRIPT; occlusive; applied neat	not an irritant or a sensitizer	210
8% Sesamum Indicum (Sesame) Seed Oil in a skin salve	51	4-wk use test; applied to lips, hands/nails, elbows, knees, feet/heels	did not elicit significant dermal irritation or dryness; 2 subjects had level 1(mild, very slight erythema on the lips, and 5 had level 1 erythema on the elbows, lips, or knees; 15 subjects reported subjective irritation	212
Solanum Lycopersicum (Tomato) Seed Oil				
0.0023% Solanum Lycopersicum (Tomato) Seed Oil in a cream cleanser	104	HRIPT with 0.2 ml of a 10% dilution of the formulation, semi-occluded	not a dermal irritant or sensitizer	278

Table 7. Clinical irritation and sensitization studies on oils.

Ingredient and Concentration	Subjects Completed	Method	Results	Reference
Theobroma Cacao (Cocoa) Seed Butter				
50.1% Theobroma Cacao (Cocoa) Seed Butter in a lip balm	106	HRIPT with 150 µl test material, semi-occluded	not a dermal irritant or sensitizer	279
Theobroma Grandiflorum Seed Butter				
5% Theobroma Grandiflorum Seed Butter in a lip balm	106	HRIPT with 150 µl test material, semi-occluded	not a dermal irritant or sensitizer	280
Triticum Vulgare (Wheat) Germ Oil				
In clinical testing, Triticum Vulgare (Wheat) Germ Oil was not an irritant or a sensitizer				30
0.005% Triticum Vulgare (Wheat) Germ Oil in a scalp conditioner/hair wax	104	HRIPT; occlusive; applied neat	not a dermal irritant or sensitizer	208
Vaccinium Macrocarpon (Cranberry) Seed Oil				
0.04% Vaccinium Macrocarpon (Cranberry) Seed Oil in a face and neck product	53	HRIPT, occluded	not a dermal irritant or sensitizer	255
Vegetable Oil				
4% Vegetable Oil in a foundation	115	HRIPT, semi-occluded	1 subject had ± on the first day of the induction only, no other reactions. Not a dermal irritant or sensitizer.	281
4% Vegetable Oil in a lipstick	106	HRIPT with 0.2 g, occluded	not a dermal irritant or sensitizer	282
11% Vegetable Oil in an eye shadow	106	HRIPT, semi-occluded	not a dermal irritant or sensitizer	283
Vitis Vinifera (Grape) Seed Oil				
39% Vitis Vinifera (Grape)Seed Oil in a preshave lotion	105	HRIPT with 0.2 ml, occluded	not a sensitizer	275
90% Vitis Vinifera (Grape) Seed Oil in a fragranced oil	105	HRIPT; semi-occluded; applied neat	not a dermal irritant or sensitizer	284
0.5% Hydrogenated Grapeseed Oil in a lip product	53	HRIPT; semi-occluded	not a dermal irritant or sensitizer	285
Zea Mays (Corn) Oil				
20% Zea Mays (Corn) Germ Oil in a cleansing oil rinse-off	214	HRIPT with 0.2 ml of a 10% v/v aqueous solution, semi-occluded	3 subjects had a "?" reaction following a patch during the induction and 1 subject had definite erythema with no edema or damage to the epidermis (+D) following the 7th patch. No reactions were observed at a new test site. No other reactions were observed. Study concluded test material was not a dermal sensitizer.	245

[a] Same 109 panelists tested these 4 formulations hat differed only in color and fragrance.

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244. Product Investigations, Inc. Determination of the irritating and sensitizing propensities of a body oil (containing 74.7% Canola Oil) on human skin. Unpublished data. 2005. Product Investigations, Inc.

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247. Product Investigations, Inc. Determination of the irritating and sensitizing propensities of a lipstick (containing 0.1% Caryocar Brasilienses Fruit Oil) on human skin. Unpublished data. 2009. Products Investigations, Inc.

248. I S Consultancy Limited. Human repeat insult patch test of a UV SPF cream containing 1% Chemopodium Quinoa Seed Oil. Report no. 06601 final. Unpublished data. 2003. I S Consultancy Limited.

249. I S Consultancy Limited. Human repeat insult patch test of a UV SPF cream containing 1% Chenopodium Quinoa Seed Oil. Report no. 06427 final. Unpublished data. 2002. I S Consultancy Limited.

250. Clinical Research Laboratories, Inc. Repeated insult patch test of a facial oil containing 2% Citrullus Lanatus (Watermelono) Seed Oil. Unpublished data. 2009. Clinical Research Laboratories, Inc.

251. Harrison Research Laboratories, Inc. Final report repeated insult patch test of product 674976 1 (lip balm containing 31% Cocos Nucifera (Coconut) Oil, 25% Prunus Amygdalus Dulcis (Sweet Almond) Oil, 24% Prunus Persica (Peach) Kernel Oil, and 3.6% Hydrogenated Cottonseed Oil). HRL Panel #07-127. Unpublished data. 2007.

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256. Clinical Research Laboratories, Inc. Repeated insult patch test on a lipstick containing 39% Hydrogenated Soybean Oil and 12% Hydrogenated Olive Oil. CRL study no.: CRL128208-13. Unpublished data. 12-24-2008.

257. Institut D'Expertise Clinique. Sensitisation and cutaneous compatibility study of product 781528 19 (skin cream containing 6% Helianthus Annuus (Sunflower) Seed Oil, 0.39% Rosa Canina Fruit Oil and 0.2% Ribes Nigrum (Black Currant) Oil). Report No. B100171RD5. 5-14-2010.

258. EVIC Portgual. Human repeat insult patch test with challenge of formula 591559 20A (face cream for dry skin containing 3% Butyrospermum Parkii (Shea) Butter, 1% Prunus Armeniaca (Apricot) Kernel Oil and 0.264% Helianthus Annuus (Sunflower) Seed Oil). Study reference DT020375. 11-21-2006.

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260. Consumer Product Testing Co. Repeated insult patch test on a mascara containing Linum Usitatissiumum (Linseed) Seed Oil at 9.4%. Experiment reference number: C08-3409.02. Unpublished data. 9-10-2008.

261. Product Investigations, Inc. Determination of the irritating and sensitizing propensities of lipstick (containing 2% Mangifera Indica (Mango) Seed Oil) on human skin. Unpublished data. 2003. Product Investigations, Inc.

262. Consumer Product Testing Co. Repeated insult patch test protocol of an eyeliner containing 3.87% Mangifera Indica (Mango) Seed Oil. Unpublished data. 2004. Consumer Product Testing Co.

263. Product Investigations, Inc. Determination of the irritating and sensitizing propensities of a facial lotion (containing 1% Mangifera Indica (Mango) Seed Butter) on human skin. Unpublished data. 2009. Product Investigations, Inc.

264. TKL Research. Repeated insult patch test of a body product containing 9% Mangifera Indican (Mango) Seed Butter. Unpublished data. 2001.

265. Product Investigations, Inc. Determination of the irritating and sensitizing propensities of an eye treatment (containing 3% Moringa Pterygosperm Seed Oil) on human skin. Unpublished data. 2007. Product Investigations, Inc.

266. Orentreich Research Corporation. Predictive patch test study of a foundation containing 1.99% Oenothera Biennis (Evening Primrose) Oil. Unpublished data. 2007.

267. Institut D'Expertise Clinque. Sensitisation and cutaneous compatibility study of a body lotion containing 1.6% Olea Europaea (Olive) Fruit Oil. Report no. B041222RD2. Unpublished data. 2004.

268. Clinical Research Laboratories, Inc. Repeated insult patch test on a body moisturizer containing 22% Olea Europaea (Olive) Fruit Oil. Unpublished data. 2007.

269. Consumer Product Testing Co. Repeated insult patch test on a conditioning hair oil containing 58.70% Olea Europaea (Olive) Fruit Oil. Unpublished data. 2003.

270. Product Investigations, Inc. Human repeat insult patch test summary formula No. 852069 (foundation containing 69.6% Olea Europaea (Olive) Fruit Oil). Report no. 25675. Unpublished data. 2009. Product Investigations, Inc.

271. Product Investigations, Inc. Determination of the irritating and sensitizing propensities on human skin for a frgranced body mist containing 2.5% Olea Europaea (Olive) Oil Unsaponifiables. Unpublished data. 2007.

272. Clinical Research Laboratories, Inc. Repeated insult patch test of a body bar soap containng 17.64% sodium olivate. Unpublished data. 2008.

273. Consumer Product Testing Co. Repeated insult patch test of a cream cleanser containing 3.79% Orbignya Oleifera Seed Oil. Unpublished data. 2006. Consumer Product Testing Co.

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278. Consumer Product Testing Co. Repeated insult patch test of a cream cleanser containing 0.0023% Solanum Lycopersicum (Tomato) Seed Oil. Unpublished data. 2006. Consumer Product Testing, Co.

279. Product Investigations, Inc. Determination of the irritating and sensitizing propensities of a lip balm (containing 50.1% Theobroma Cacao (Cocoa) Seed Butter) on human skin. Unpublished data. 2006. Product Investigations, Inc.

280. Product Investigations, Inc. Determination of the irritating and sensitizing propensities of a lip balm (containing 5% Theobroma Grandiflorum Seed Butter) on human skin. Unpublished data. 2008. Product Investigations, Inc.

281. Clinical Research Laboratories, Inc. Repeated insult patch test of a foundation containing 4% Vegetable Oil. Unpublished data. 2005. Clinical Research Laboratories, Inc.

282. Consumer Product Testing Co. Exclusive repeated insult patchtest on a lipstick containing 4% vegetable oil. Ref. No. C07-0193.12. Unpublished data. 2007.

283. Clinical Research Laboratories, Inc. Repeated insult patch test of an eye shadow containing 11% vegetable oil. CRL study number: CRL14606-4. Unpublished data. 3-30-2006.

284. Clinical Research Laboratories, Inc. Repeated insult patch test of product 1061119 (fragranced oil containing 90% Vitis Vinifera (Grape) Seed Oil). Study No. CRL65209. 11-3-2009.

285. Clinical Research Laboratories, Inc. Repeated insult patch test of a lip product containing 0.5% hydrogenated grapeseed oil. CRL study number: CRL88908-5. Unpublished data. 9-8-2008.

DATA

Personal Care Products Council
Committed to Safety, Quality & Innovation

Memorandum

TO: F. Alan Andersen, Ph.D.
Director - COSMETIC INGREDIENT REVIEW (CIR)

FROM: John Bailey, Ph.D. 8/23/10
Industry Liaison to the CIR Expert Panel

DATE: August 23, 2010

SUBJECT: Comments on the Draft Report on Vegetable Oils Prepared for the August 30-31, 2010 CIR Expert Panel Meeting

More information about the composition of the plant oils can be found in the published literature. Please see the attached examples of references that may be useful for additional composition information.

p.1 - Please state that the simple salts are salts of the fatty acids.

p.3, 43, Table 5d - As some of these ingredients have recently be reviewed (or re-reviewed) and found to be safe, and because use concentrations were relatively high, new concentration of use information is not going to be collected on Carthamus Tinctorius (Safflower) Seed Oil, Oryza Sativa (Rice) Germ Oil, the Sesame ingredients (2009 use information) and the Corn ingredients.

p.5 - Although the LLNA is an alternative method, it is not an *in vitro* method.

p.5 - In the Rice Oil summary, what are the units for 55.

p.8 - As some phototoxicity studies are summarized in the Irritation/Sensitization/Allergenicity section, Phototoxicity should be added to this heading.

p.10 - Did the recommendation to avoid soybean oil include dermal exposure? Or was this study (reference 48) focused on dietary exposure?

p.21, 25, Table - Ben Oil (p.21) and Moringa Oil (p.25) are from the same species, *Moringa oleifera.*

p.40, Table 5b - Use information was collected for the 2009 re-review of the Sesame ingredients. That use information should be included in this table.

p.42, Table 5c - Why is Vitis Vinifera (Grape) Seed Oil included in the Table of Ingredients not reported to be used? On p.37, Table 5a Vitis Vinifera (Grape) Seed Oil is listed as having 465 uses according to the VCRP. Use concentrations of 0.001-43% have been reported. All the of ingredients in Table 5c were not checked to see if there are any other ingredients that have uses.

p.41, Table 5b - Please define NS at the end of this table.

p.47, Table 7 - Please see revised memo 8 and add that the face and neck product contained 5% Rubus Idaeus (Raspberry) Seed Oil.

Examples of Additional References for Plant Oil Composition Information
(identified by searching Google for oil name composition; or as described below; the objective was to find one reference per oil; no searching was done for the other ingredients included in this report)

Elaeis Guineensis (Palm) Butter
http://www.in-cosmetics.com/ExhibitorLibrary/153/REDPALM_2.pdf

Elaeis Oleifera Kernel Oil
Tan BK, Berger KG. 1982. Characteristics of kernel oils from Elaeis oleifera, F1 hybrids and back-cross with Elaeis guineensis. Journal of the Science of Food and Agriculture 33(2): 204–208.

Olea Europaea (Olive) Husk Oil
Bouaziza M, Fkia I, Jemaia H, Ayadib M, Sayadia S. 2008. Effect of storage on refined and husk olive oils composition: Stabilization by addition of natural antioxidants from Chemlali olive leaves. Food Chemistry 108, Issue 1:253-262.

Actinidia Chinensis (Kiwi) Seed Oil
Although from the abstract it is not clear if Kiwi Seed Oil is in this article, this article does come up on Google when searching for the composition of Kiwi Seed Oil
Lsa M, Holcape M, Bohac M. 2009 Statistical evaluation of triacylglycerol composition in plant oils based on high-performance liquid chromatography-atmospheric pressure chemical ionization mass spectrometry data. Journal of Agricultural and Food Chemistry 57(15): 6888-6898.
This book may also be useful for Kiwi Seed Oil as well as other oils.
Gunstone FD, Harwood JL, Dijkstra, AJ. 2007. The Lipid Handbook with CD-ROM, 3rd edition. CRC Press.
(Search Google books for The Lipid Handbook)

Arctium Lappa Seed Oil
Although it may be possible to extract a fixed oil from the seed of *Arctium lappa*, internet searching suggests the essential oil is more common.

Astrocaryum Murumuru Seed Butter
The following article was found by searching the Agricola database at
http://agricola.nal.usda.gov/
Saraiva SA, Cabral EC, Eberlin MN, Rodrigo R. 2009. Amazonian vegetable oils and fats: Fast typification and quality control via triacylglycerol (TAG) profiles from dry matrix-assisted laser desorption/ionization time-of-flight (MALDI-TOF) mass spectrometry fingerprinting. Journal of Agricultural and Food Chemistry 57(10): 4030-4034.
Abstract: "Amazonian oils and fats display unique triacylglycerol (TAG) profiles and, because of their economic importance as renewable raw materials and use by the

cosmetic and food industries, are often subject to adulteration and forgery. Representative samples of these oils (andiroba, Brazil nut, buriti, and passion fruit) and fats (cupuau, murumuru, and ucuba) were characterized without pre-separation or derivatization via dry (solvent-free) matrix-assisted laser desorption/ionization time-of-flight mass spectrometry (MALDI-TOF MS). Characteristic profiles of TAG were obtained for each oil and fat. Dry MALDI-TOF MS provides typification and direct and detailed information, via TAG profiles, of their variable combinations of fatty acids. A database from spectra could be developed and may be used for their fast and reliable typification, application screening, and quality control."

Avena Sativa (Oat) Kernel Oil
See: http://jxb.oxfordjournals.org/cgi/content/full/erm125v2

Bassia Butyracea Seed Butter
Bassia Latifolia Seed Butter
See: http://www.personalcaremagazine.com/Print.aspx?Story=4685 (This article includes many additional oils)

Sclerocarya Birrea Seed Oil
The following reference was found by searching Sclerocarya Birrea on PubMed.
Ogbobe O. 1992. Physico-chemical composition and characterisation of the seed and seed oil of Sclerocarya birrea. Plant Foods Hum Nutr. 42(3):201-6.
Abstract: "The physicochemical composition of Sclerocarya birrea was assessed by standard methods and was found to contain 11.0% Crude oil, 17.2% Carbohydrate, 36.70% Crude protein 3.4% fibre and 0.9% crude saponins. The fatty acid distribution in the seed oil was obtained by fractionating the volatised fatty acid by GC-MS. The oil is made up of nine fatty acids of which palmitic, stearic and arachidonic acids are the most dominant."

Personal Care Products Council
Committed to Safety, Quality & Innovation

Memorandum

TO: F. Alan Andersen, Ph.D.
Director - COSMETIC INGREDIENT REVIEW (CIR)

FROM: John Bailey, Ph.D. 8/23/10
Industry Liaison to the CIR Expert Panel

DATE: August 23, 2010

SUBJECT: Comments on the Draft Report on Nut Oils Prepared for the August 30-31, 2010 CIR Expert Panel Meeting

p.1 - Please state that the simple salts are salts of the fatty acids.
p.4 - Please provide the reference for "One source" reporting use of Corylus Avellana Seed Oil at concentrations up to 100%.
p.7 - Please include the type of test(s) in which guinea pigs were tested for sensitization to Cocos Nucifera (Coconut) Oil and Hydrogenated Coconut Oil.
p.16 - Please state that the 0.51% Plukenetia Volubilis Seed Oil was in a formulation.
p.16 - It would be helpful to state that the efficacy studies were in humans.
p.21-22, Table 3 - What is meant by the row heading Appearance? It seems that Specific Gravity values are in this row.