Network Nutrition®
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Climbing the Herbal Quality Mountain

Trials, Tribulations & Test Methods

Ryan Gorman – Brand Director
Network Nutrition-IMCD
rgorman@imcd.com.au

NHPNZ Supplier's Day
Auckland, 21 August 2019

BEFORE

AFTER

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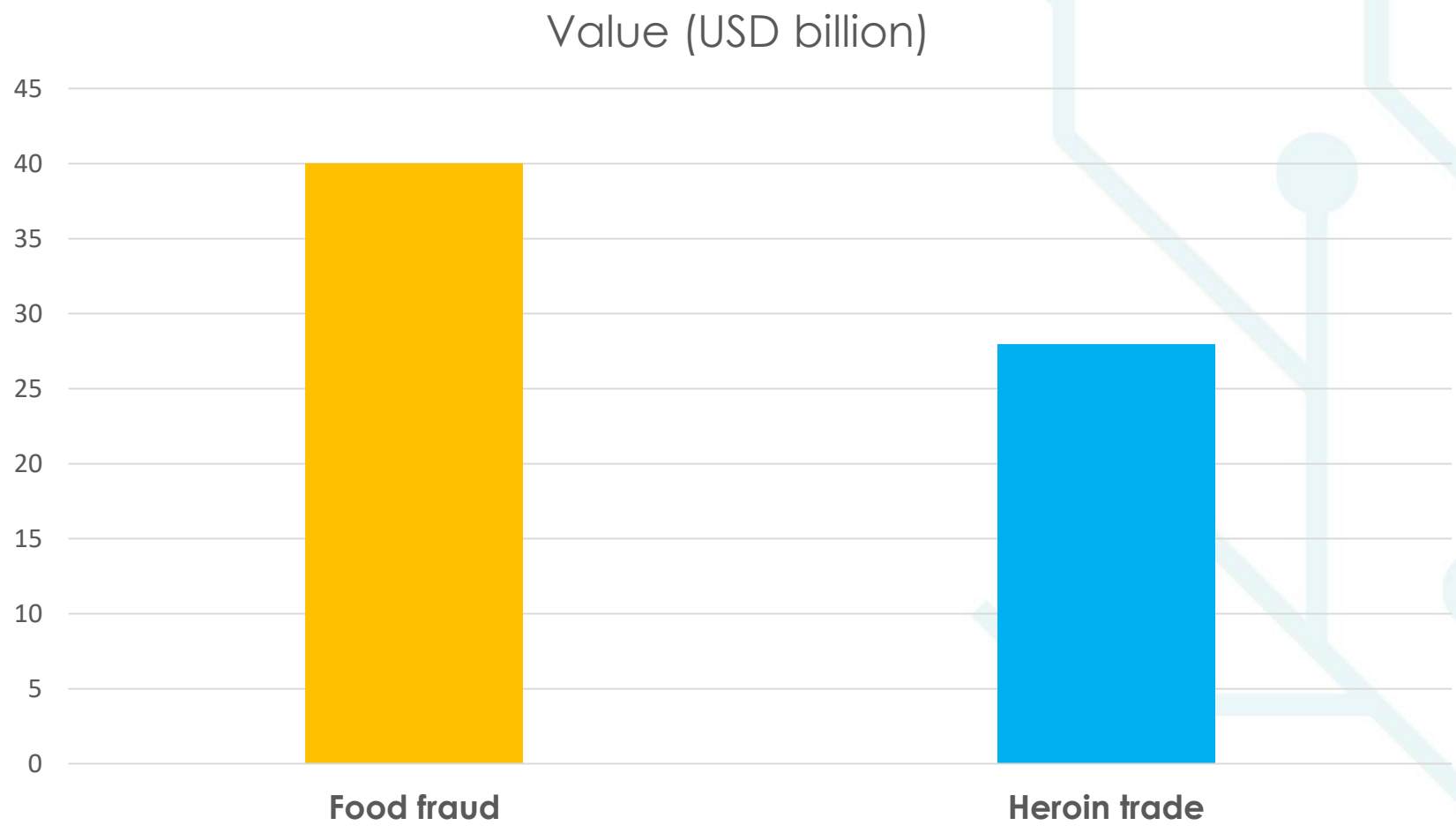
- Food Fraud and Supply Chain Impact
- Affected Herbal Ingredients
- Mechanisms to Protect your Supply Chain

What is Food Fraud?



Source: PriceWaterhouse Coopers

What you don't know can hurt you. Take action.

Globalisation and complex supply chains are creating huge opportunities and rewards for fraudsters. Today, even the most basic foods can involve thousands of suppliers around the world. Small wonder, then, that food fraud is increasing.

Our food fraud vulnerability assessment is purpose built to help companies identify areas of vulnerability and meet new requirements of GFSI recognised certification schemes.

It's a great place to start in identifying your vulnerabilities and planning your mitigation efforts.

Source: PriceWaterhouse Coopers

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Newshub.
14 August 2019

AUCKLAND 15° 8° MORE WEATHER ▸

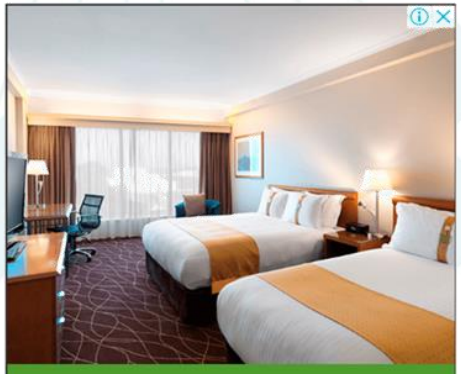
Magic Talk LISTEN NOW

HOME NZ WORLD POLITICS SPORT ENT TRAVEL LIFESTYLE RURAL MONEY SHOWS

Food fraud: Should we be worried?

10/08/2019 | Angie Skerrett

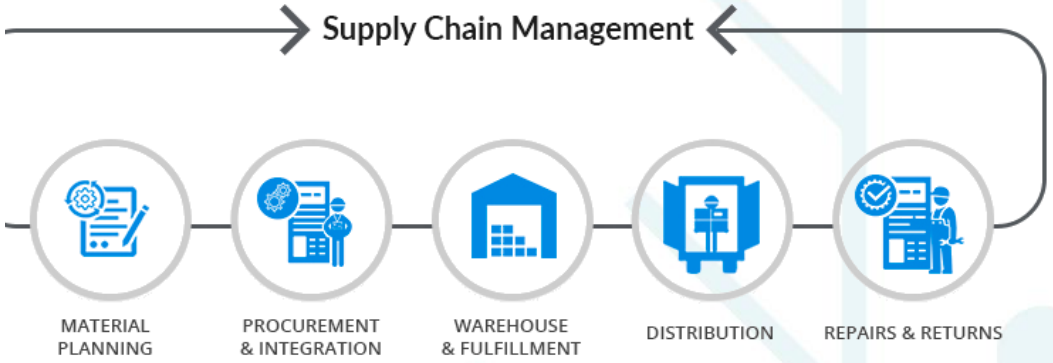
Reddit Tweet Share



"These are products which have been diluted, an active ingredient had been removed, and an alternative had been put in its place."

He said it usually meant that the consumer was paying more than they should, for something that was not what they wanted.

Why Adulterate?



A general approach to prevent food fraud can be summarised as follows:

- Conduct vulnerability assessment, including:
  - Know your materials and risks (history, economic factors, geographical origins, physical state, emerging issues);
  - Know your suppliers (manufacturer, broker, history);
  - Know your supply chain (length, complexity, supply & demand arrangements, ease of access);
  - Know your existing control measures.
- Design mitigation strategy and implement mitigation measures.
- Validate and verify mitigation measures, continually review food fraud management system.

Nestlé

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NEWS

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Asia-Pacific

China dairy products found tainted with melamine

9 July 2010 Share

Bloomberg

Even after a subsequent crackdown, scandals continued. In 2016, Shanghai police arrested nine people for producing and selling fake formula under the brand names Similac and Beingmate.

As recently as November, more than 18,000 cans of infant formula produced by Xinjiang Western Animal Husbandry were found to contain expired ingredients.

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The Guardian

Horsemeat discovered in burgers sold by four British supermarkets

Tesco drops Irish supplier over horsemeat scandal

Tesco drops Silvercrest for 'breach of trust' after it supplied meat with up to 29% equine DNA that had come from Poland

Waitrose reports sales surge after avoiding horsemeat scandal

Supermarket says it is winning shoppers from Tesco after no horse DNA was found in its products

Horsemeat scandal highlights gaps in regulation of our food industry

The adulteration scandal raises important questions about how we as a nation trace, make and look after the food we eat

Contaminated horsemeat could harm health, warns environment secretary

Owen Paterson says tests may reveal presence of horse drug phenylbutazone, which could be 'injurious' to human health

Two men jailed in UK for horsemeat conspiracy

Andronicos Sideras and Ulrik Nielsen jailed for roles in 'greed-motivated' plot to pass off 30 tonnes of horsemeat as beef

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The Crimes (Contamination Offences) Amendment Bill comes in the wake of last year's Australian strawberry needle scare which triggered copycat offences here.

Horticulture New Zealand is among those applauding Mr Guy's move.

"People need to understand the full and serious implications of such sabotage, said chief executive Mike Chapman.

"They may think they are being funny but in fact, they could damage the international reputation of New Zealand as a source of safe food, affecting our trade and consequently, the country's balance sheet," he said.

FOOD
navigator-asia.com

Food contamination on par with 'treason': New Zealand food industry backs bill demanding harsher punishment for saboteurs

By Pearly Neo

05-Feb-2019 - Last updated on 04-Feb-2019 at 03:16 GMT

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ABC NEWS

'Fake' honey allegations subject of 'high priority' ACCC investigation

The Sydney Morning Herald

New purity test on the cards amid honey 'adulteration' scandal

Market Leader Position – 3 September 2018

Capilano - currently the subject of a $190 million takeover bid - said NMR tests were not the best way to detect whether honey had been mixed with other substances, and that Australian and international regulators do not use it.

Market Leader Position – 5 September 2018

But had since released a statement saying Australia needed to develop its own NMR testing facility.

And it even offered to help fund it.

"Capilano, with other industry players and requested Federal Government support, will fund the establishment of an Australian-based NMR facility for honey testing," the statement said.

New Zealand brings first 'fake mānuka honey' prosecution

Company is accused of adding synthetic chemicals, including one used in tanning lotion, to honey

▲ The ingredients Evergreen Life Ltd is accused of adding to its mānuka honey in New Zealand are not designed to be added to food. Photograph: D and S Photographic Services //Alamy

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LAWRENCE SMITH/STUFF

Jason Lee at sentencing in the Auckland District Court.

NZD372,500

At least 14MT of honey affected

Imports of Manuka honey products banned from today

FMT - February 28, 2016 8:00 PM

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- 15 months denying all charges;
- Aug 2015 – VW admits to ECS being 'rigged';
- 22 Sept 2015 – VW finally admits to 'cheat device' deliberately fitted to 11 million vehicles, with intent to deliver falsely compliant emissions diagnoses;
- 23 Sept 2015 - CEO resigns;
- 23-24 Sept 2015 - Share price plummets 37%;
- Sheds 30,000 jobs;
- Withdraws diesel cars from US market.

Total cost to VW resulting from fraudulent activity – USD40b

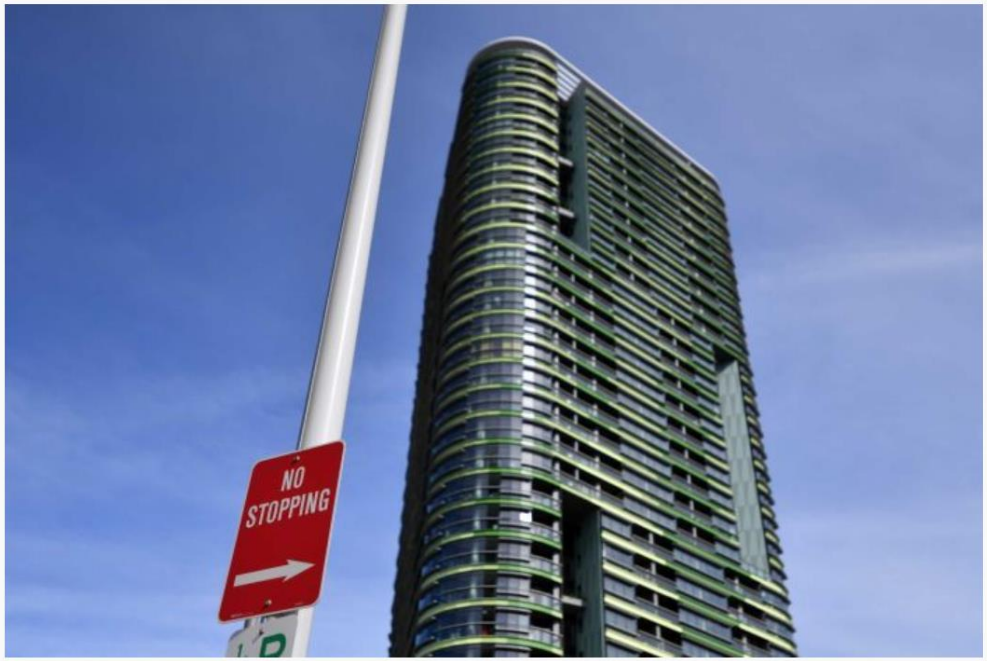

PHOTO: Sydney's Opal Tower was evacuated after a concrete panel cracked. (AAP: Mick Tsikas)

The poor companies are low-cost, low-standard outfits. The good companies have to compete with this and it tends to be a race to the bottom. As one builder told me candidly, "if they buy rubbish, we will build rubbish". – ABC News, Australia

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FAKE FREE INDIA
#FAKEKOFEK
DRIVE AGAINST FAKE FOOD SUPPLEMENTS

The New York Times

New York Attorney General Targets Supplements at Major Retailers

ABC AHP NCNPR
Botanical Adulterants Prevention Program

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Consumer popularity increases

Brands under hefty price competition

Cost-cutting measures emerge

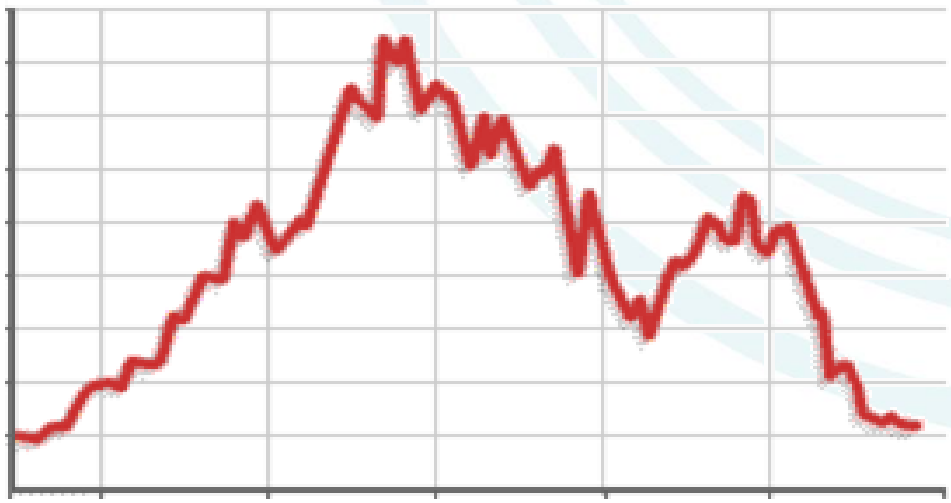
Fraudulence enters sector

Untenable market/ consumer risk

Fraudulence revealed

Product/ market adversely affected

Market enters decline




AFTER YEARS OF MARGIN IMPROVEMENT, THERE'S NOTHING LEFT BUT AN EMPTY BOX. I DON'T THINK THERE'S ANY MORE WE CAN COST-CUT.
WE COULD PHASE OUT THE BOX.
TOM FISH BURNE
©marketoonist.com

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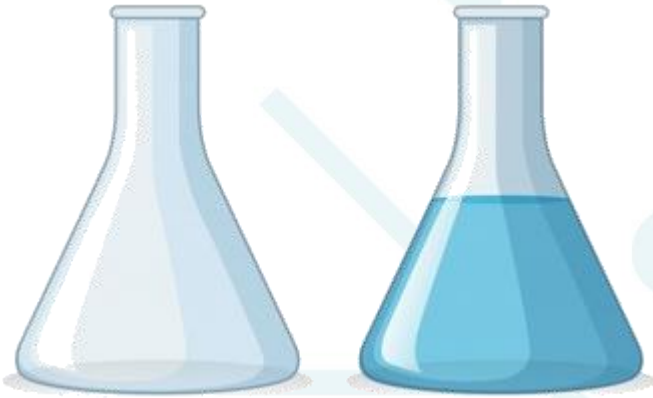
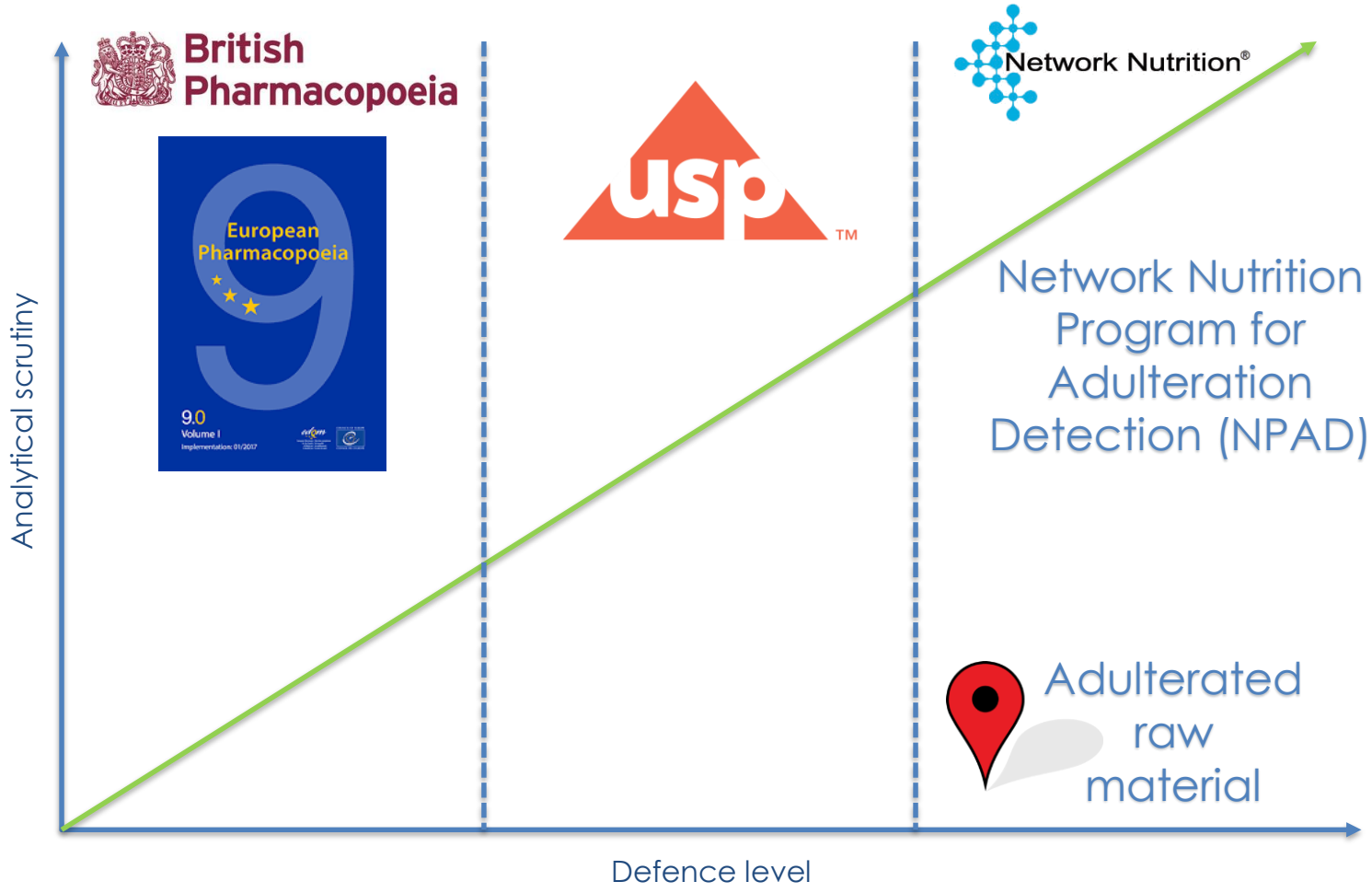
Why Test?

- Consumer safety
- Product integrity
- Brand protection
- Preserve Consumer trust
- Risk mitigation
- Shield against expensive recalls
- Liability
- Insurability
- Regulatory
- Legal
- Competitive defence
- Offensive strategy
- **ADULTERATION DETECTION**

What to Test?

- Identification/ authenticity
- Standardisation/ Activity/ Assay
- Heavy metals
- Microbiology
- Moisture
- Bulk density
- Particle size
- Solubility
- Pesticide residues
- Solvent residues
- Polycyclic Aromatic Hydrocarbons
- Pyrrolizidine Alkaloids
- Mycotoxins/ Aflatoxins/ Ochratoxin A
- Innate chemical impurities
- Ash
- Foreign Matter
- Organoleptic, etc, etc, etc….




British Pharmacopoeia
European Pharmacopoeia
9.0
Volume I
usp
Network Nutrition®
Network Nutrition Program for Adulteration Detection (NPAD)
Adulterated raw material
Analytical scrutiny
Defence level

Fitoterapia 99 (2014) 124–138

Contents lists available at ScienceDirect

Fitoterapia

journal homepage: www.elsevier.com/locate/fitote

Pharmacopeial HPLC identification methods are not sufficient to detect adulterations in commercial bilberry (*Vaccinium myrtillus*) extracts. Anthocyanin profile provides additional clues

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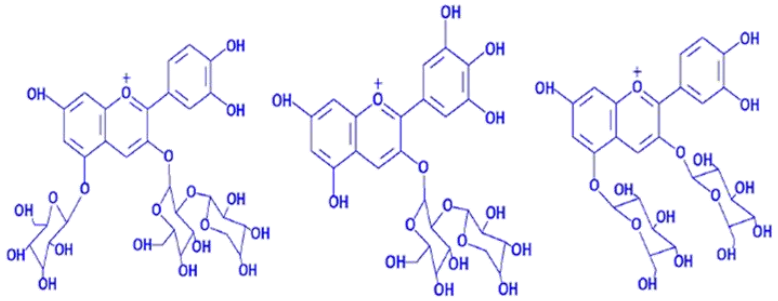
Analytical standard	ID Tests Performed
BP	Requires assessment of peak retention times
USP	Requires assessment of peak retention times and intensities
Network Nutrition-IMCD	Requires detailed profile assessment including retention times, intensities, order and absence/ presence of wanted/ unwanted peaks

(a) From the start to the elution of delphinidin-3-O-galactoside (peak 1), appearance of a peak is indicative of possible adulteration with dye amaranth.
(b) The appearance of a new peak between delphinidin-3-O-galactoside (peak 1)and delphindin-3-O-glucoside (peak 2) is indicative of adulteration with one or more of the berry species of *Sambucus* (eg. elderberry), *Lonicera*, *Viburnum*, *Ribes* (eg. blackcurrant) and *Aristotelia chilensis* (Maqui).

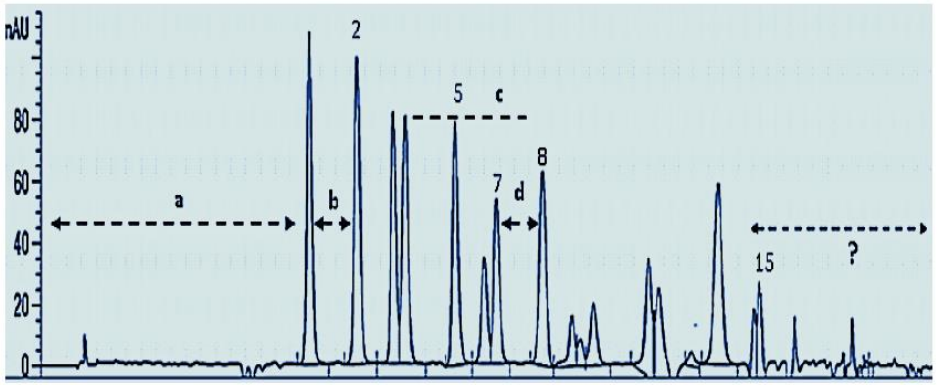
The adulterant markers are:



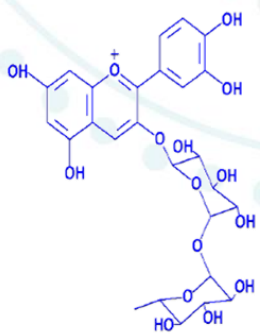
Cyanidin-3-O-sambubioside-5-glucoside, Delphinidin-3-O-sambubioside and Cyanidin-3,5-diglucoside

Any substantial increase in cyanidin-3-O-galactoside (peak 3) with concomitant reduction in other anthocyanin peaks intensities point to possible adulteration with berries of *Vaccinium vitis-idaea* or *Aronia melanocarpa*.

(c) The most widespread and predominant anthocyanin in plants is cyanidin-3-O-glucoside[3] (peak 5). A substantial increase in the intensity of peak 5 in bilberry HPLC profile than any of peaks 1-4 is pointer to adulteration with cyanidin-3-O-glucoside predominant species.
(d) Cyanidin-3-O-rutinoside elutes between cyanidin-3-O-arabinoside (peak 7) and petunidin-3-O-glucoside (peak 8)[4]. Cyanidin-3-O-rutinoside is a pointer to adulteration with *Morus sp*. (eg. Mulberry), elderberry and blackcurrant.



THE PROFILE MUST SHOW ALL 15 ANTHOCYANOSIDES TYPICAL OF BILBERRY – THIS ENSURES THAT THERE IS NO SUBSTITUTION



Cyanidin-3-O-rutinoside

Anthocyanin profiles of some blueberry species (*V. corymbosum*, *V. angustifolium*, *V. uliginosum*, *V. virgatum* and *V. darrowii*) show complete overlap with bilberry anthocyanin profiles. The former two species can be distinguished from bilberry by the presence of acylated anthocyanins – which tend to elute as strong peaks after peak 15 (Malvidin-3-O-arabinoside) and hence can be used as adulteration markers.

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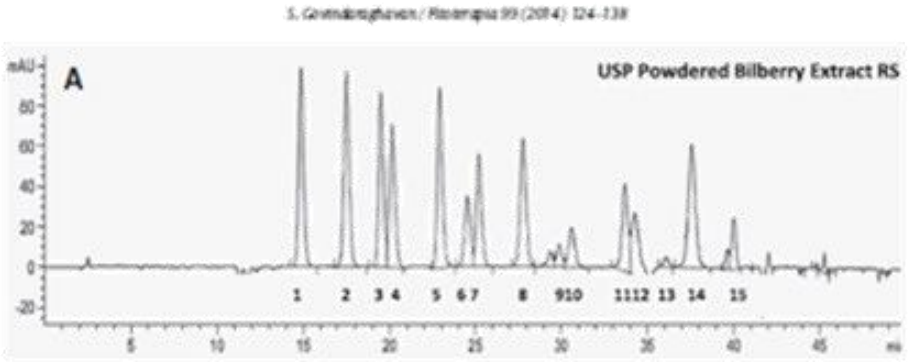

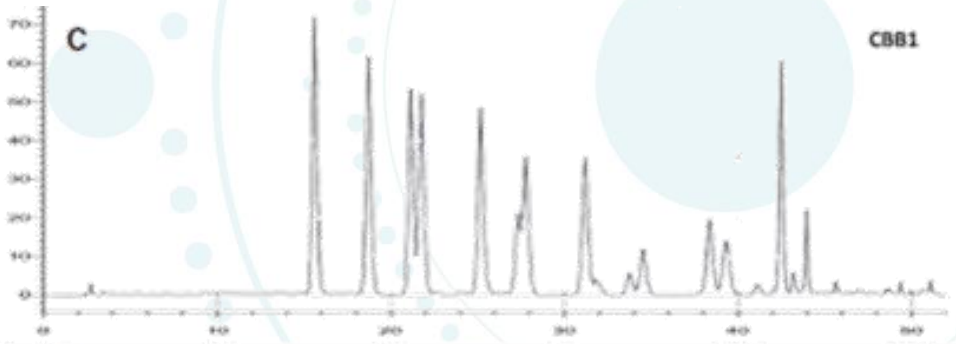

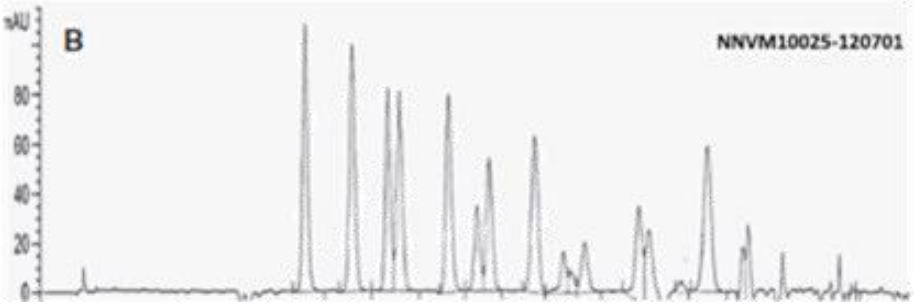

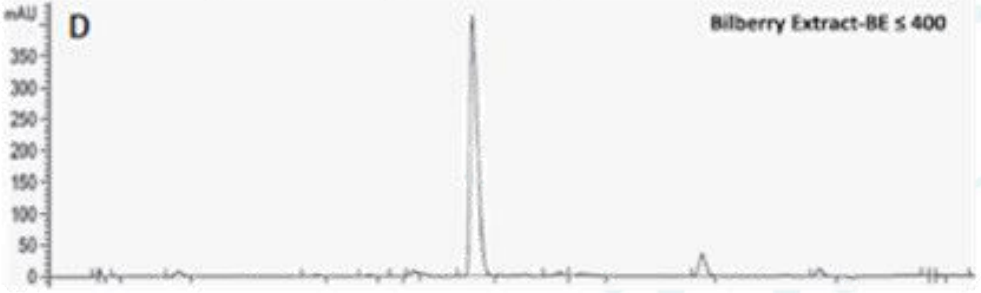

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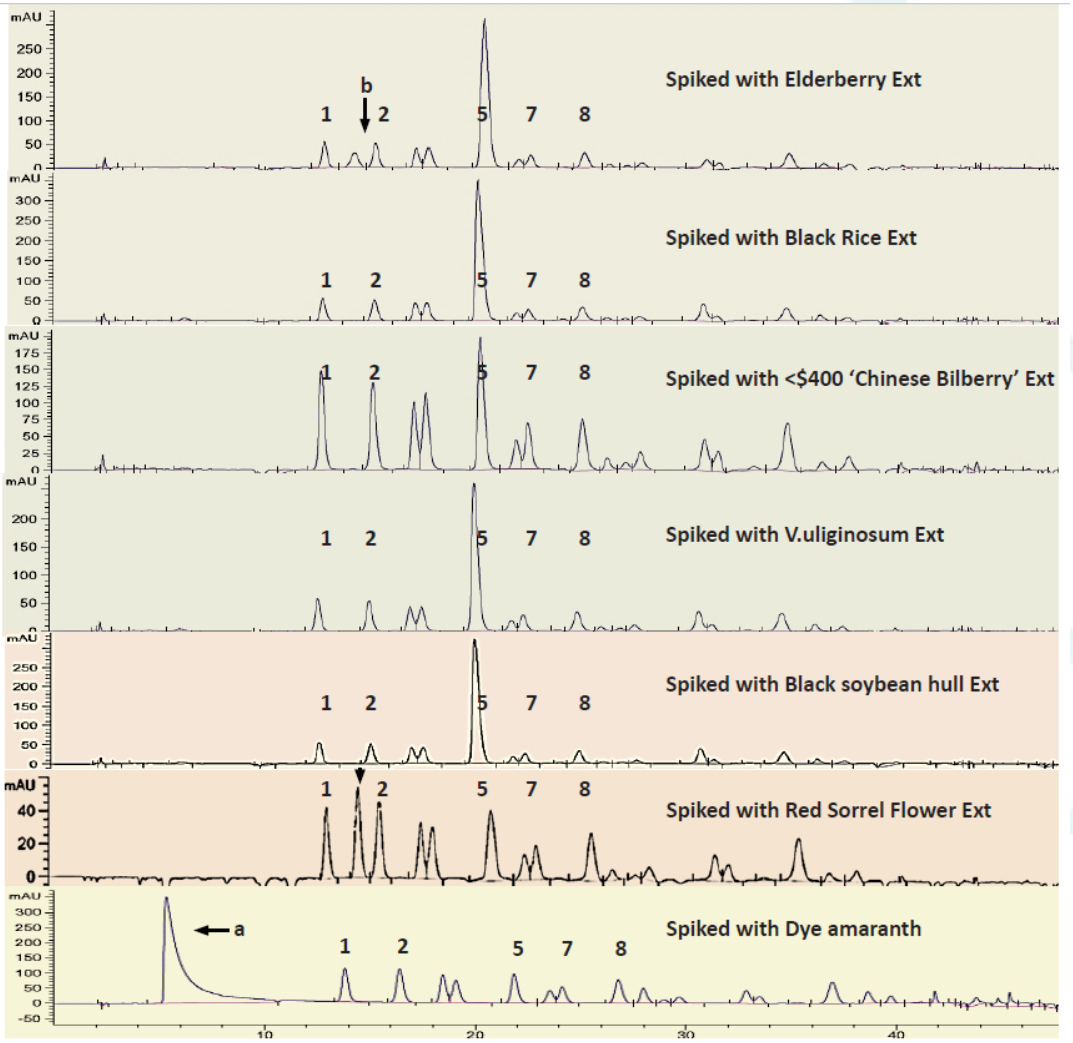

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Botanical Adulterants Program

BOTANICAL ADULTERANTS BULLETIN

on Bilberry (*Vaccinium myrtillus*) Extracts

By Stefan Gafner, PhD*
* American Botanical Council, P.O. Box 144345, Austin, TX 78723
Corresponding author: email

Fitoterapia 121 (2017) 64–75

Contents lists available at ScienceDirect

Fitoterapia

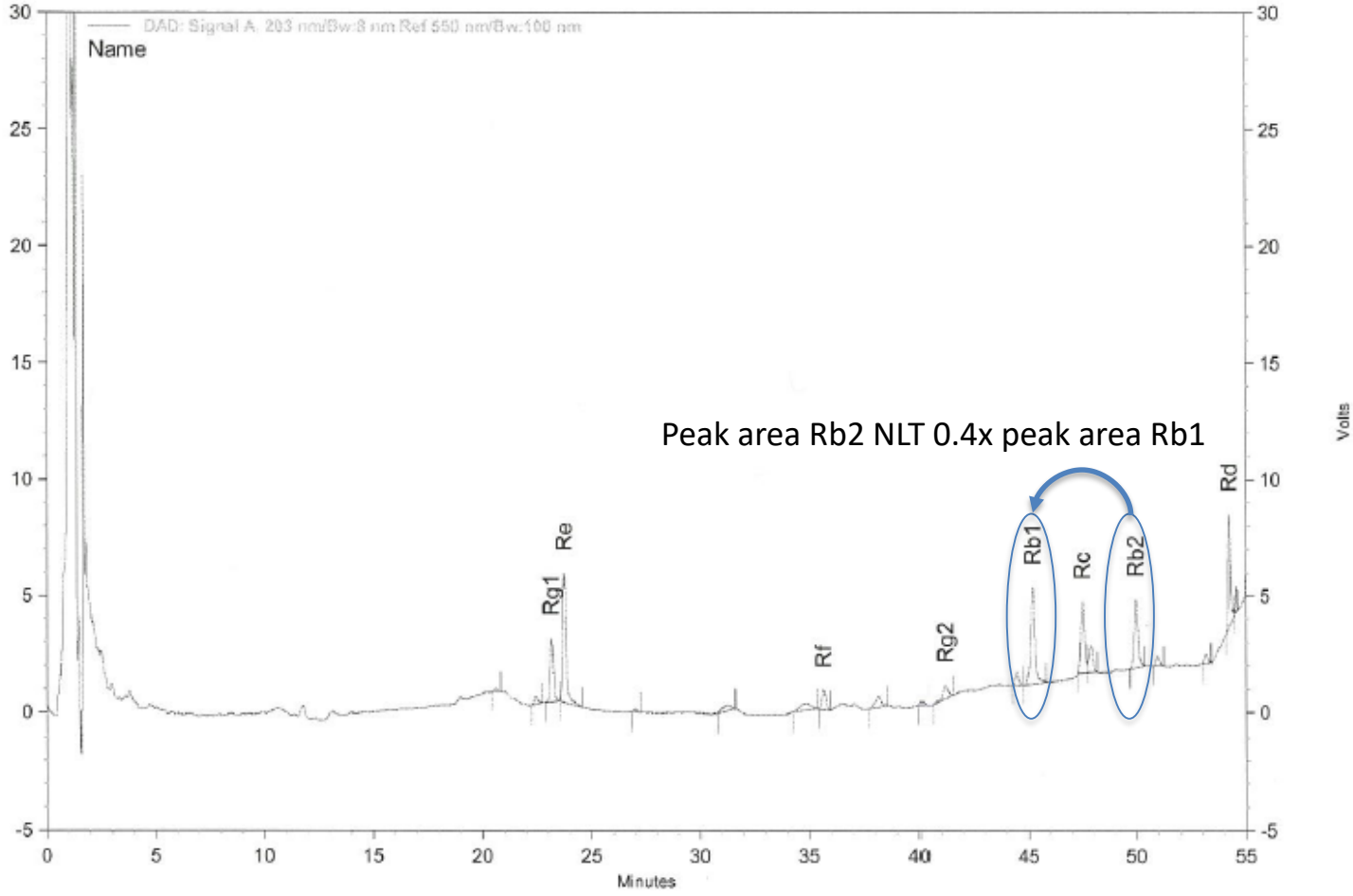
journal homepage: www.elsevier.com/locate/fitote

Multiple ginsenosides ratios pattern — A pointer to identify *Panax ginseng* root extracts adulterated with other plant parts?

Analytical standard	ID Tests Performed
BP	TLC identification only
USP	TLC identification **PLUS** HPLC ID Test C comparing ratios of two ginsenosides
Network Nutrition-IMCD	Full USP ID (TLC & HPLC characterisation) **PLUS** comparison of eight ginsenosides ratios to determine profile pattern

56%

Commercial Ginseng root samples found to be adulterated/ contaminated during a 2016 investigation into Ginseng extracts supplied to EU


DAD: Signal A, 203 nm/Bw:8 nm Ref 550 nm/Bw:100 nm
Name
Volts
Minutes
Re
Rg1
Rf
Rg2
Rb1
Rc
Rb2
Rd
Peak area Rb2 NLT 0.4x peak area Rb1

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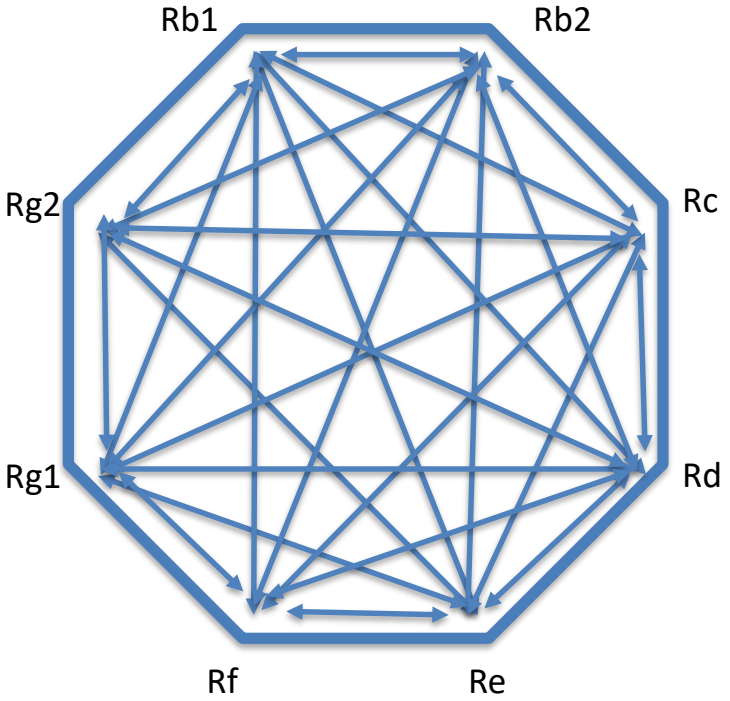
From this...

Rb2 ⟷ Rb1

...To this!



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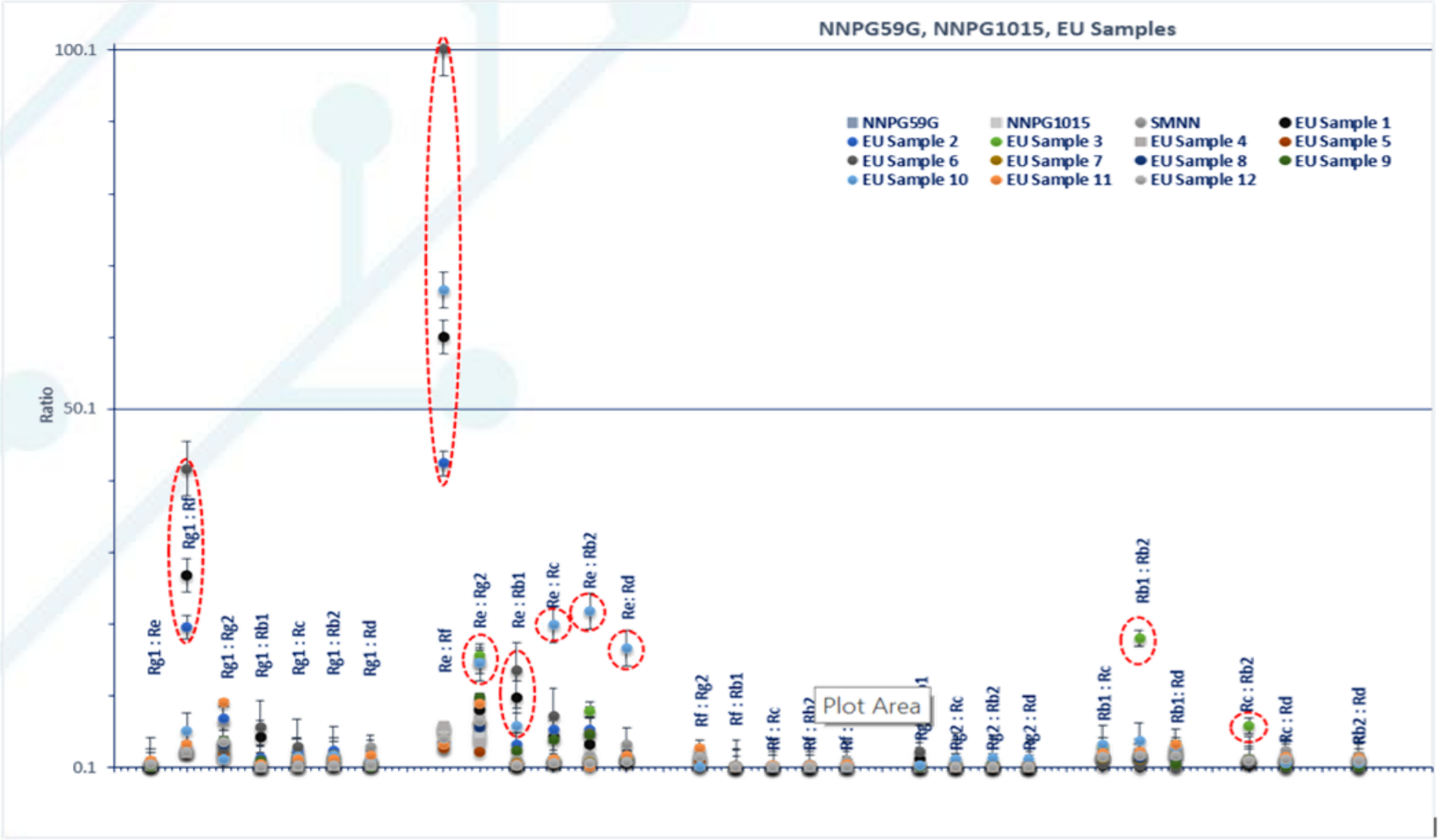

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Fitoterapia 134 (2019) 389–403

Contents lists available at ScienceDirect

Fitoterapia

journal homepage: www.elsevier.com/locate/fitote

Adulteration of commercial grape seed extracts and other proanthocyanidins (PACs)-rich herbal extracts: Multi-compound HPLC profile patterns provide key to detection

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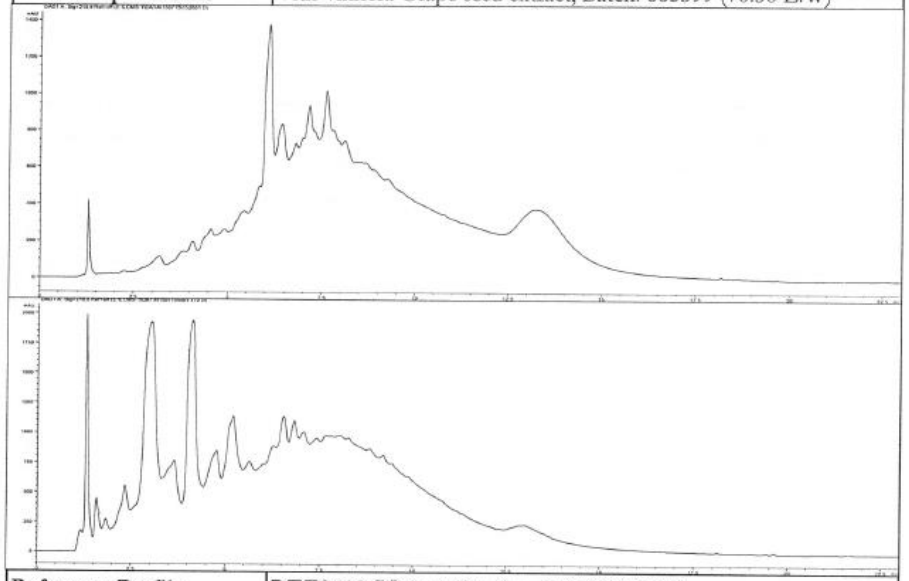
Sample	Vitis vinifera Grape seed extract		
Class	Capsules		
Date	17 July 2015		
Customer	Network Nutrition (IMCD Australia Ltd)		
Customer Ref.#	Batch: 665399		
Laboratory Ref. #	ARL152681	**Job #**	A151058
Analysis	Herb Profiling – HPLC – ARL-TM125		
Test Sample Profile	Vitis vinifera Grape seed extract, Batch: 665399 (70:30 E:W)		



Reference Profile	REF0412 *Vitis vinifera* (seed) (70:30 E:W)
Comments	

The HPLC-210nm profile of sample Batch: 665399 within the expected range of biological and processing variation, was not consistent with the reference sample REF0412 (*Vitis vinifera* seed extract), the extract appears to be consistent with one of peanut skin (*Arachis* sp.) based on comparison with reference profiles and presence of characteristic type A proanthocyanidins. Expanded overlays are attached to facilitate comparison.

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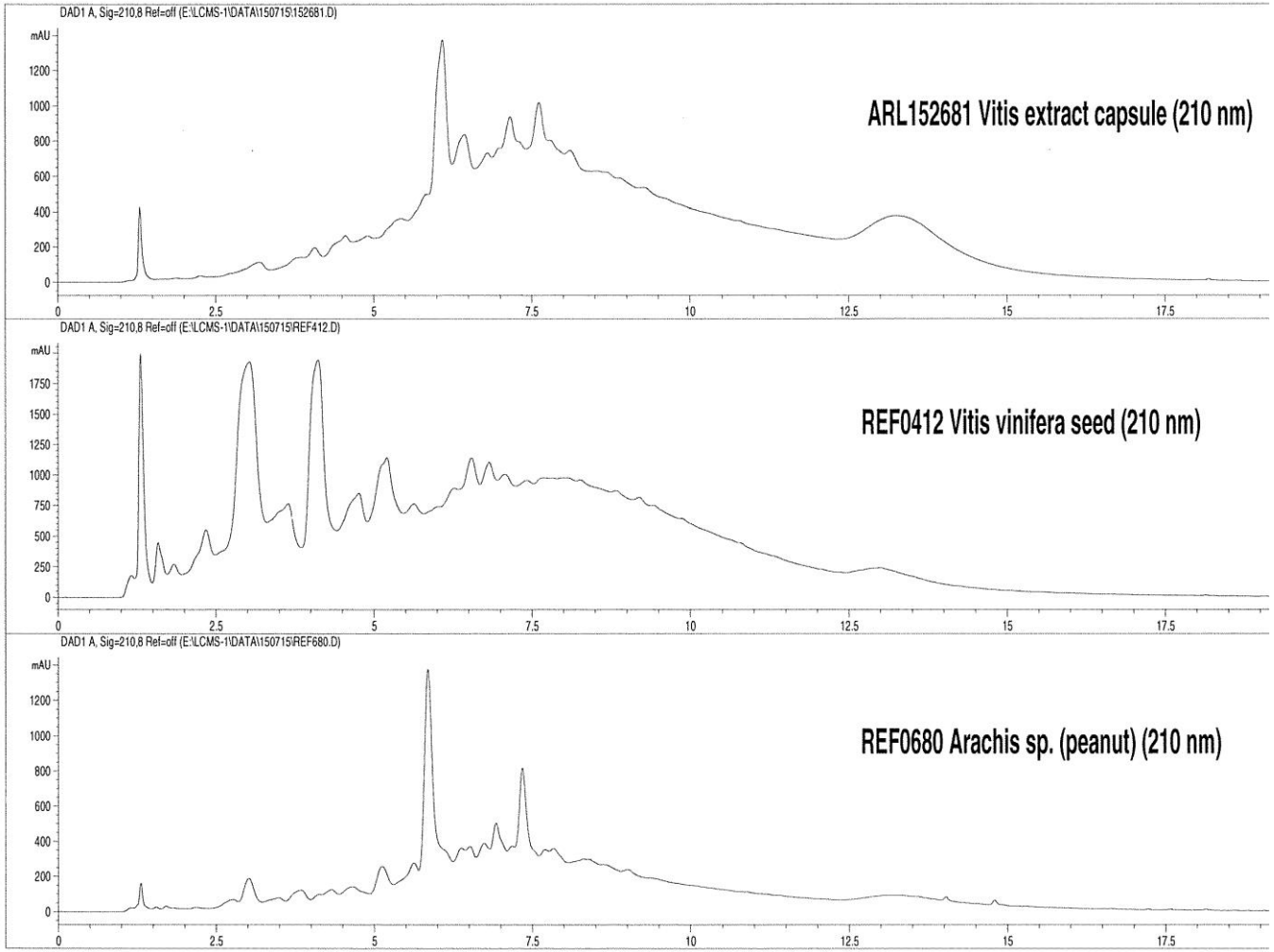
or



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Fitoterapia 131 (2018) 146–159

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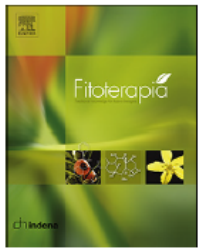

Increasing sophistication in adulteration of commercial *Ginkgo biloba* leaf products: Detection using existing methods of analysis of ginkgoflavone glycosides

- Consistently Top 25 herbal ingredients Worldwide;
- Exceptionally well-established and qualified natural medicine ingredient;
- Subject to several iterations of adulteration techniques;
- Extremely difficult to control pesticide residues to meet UK/ EU standards;
- Market ubiquity invites extreme price competition which brings cost-cutting measures and with it, adulteration.

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1st Wave – Rutin spiking

2nd Wave – Rutin & Quercetin spiking

3rd Wave – addition of/ substitution with *S. japonica*

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14/15

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2/7

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11	samples failed the limit test for quercetin
9	samples contained high concentrations of genistein (>0.14%)
7	samples failed the ratio limit test for isorhamnetin to quercetin (I:Q)
4	samples contained notable levels of genistein (0.0234% - 0.1358%)
5	samples exceeded the strict safety and quality standard of 5ppm for ginkgolic acids
3	samples failed the ratio limit test for kaempferol to quercetin (K:Q)
2	samples failed the limit test for rutin
1	sample passed all tests

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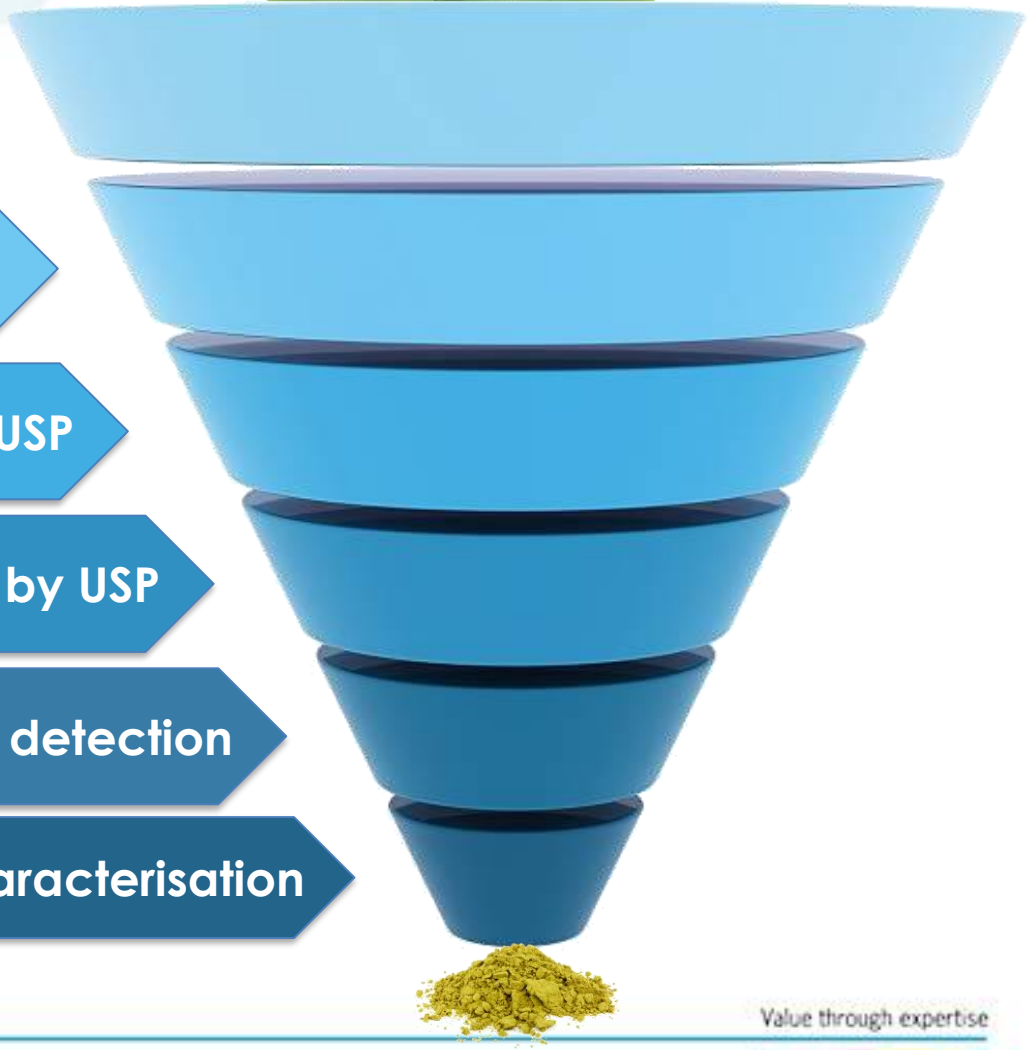
- GFG assay by USP
- Ratios of K:Q & I:Q ratios by USP
- Ginkgolic acids by USP
- Free Quercetin & Rutin Limits by USP
- Genistein detection
- Sophora-specific compound characterisation



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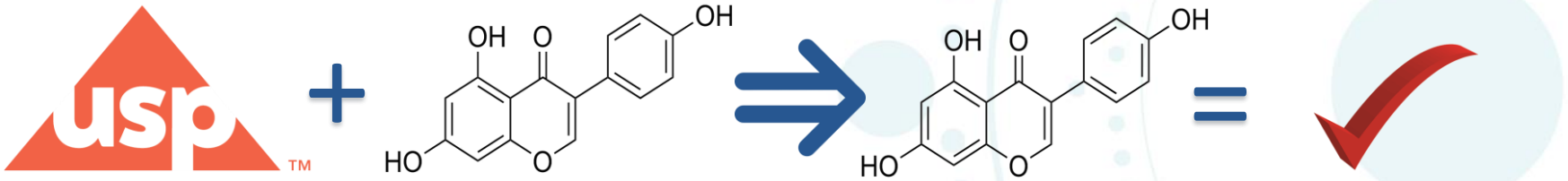

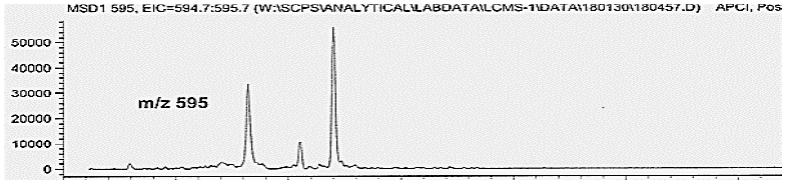

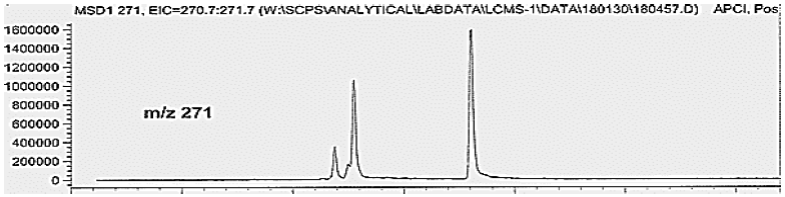

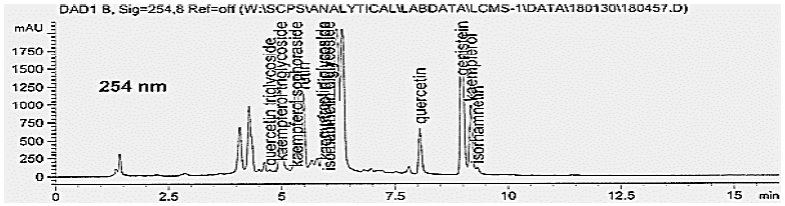

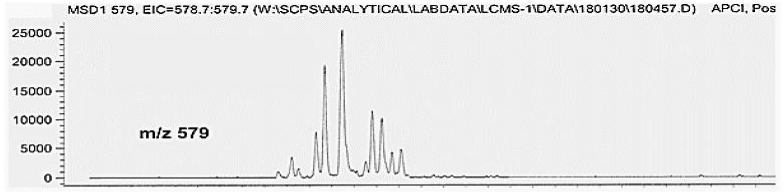

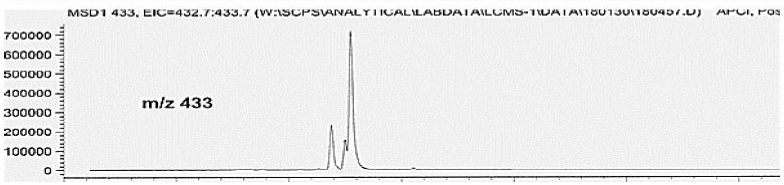

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5. Product Statements & Certifications

5.1. Authenticity Guarantee

We confirm this product is true-to-label and assign by default our Authenticity Guarantee to any direct buyer of this product. This product complies with food law as specified in Regulation (EC) 178/2002 with special attention given to Articles 8(a), (b) and (c) in relation to fraudulent and deceptive practices, adulteration, and misleading the consumer respectively. This product complies with the United States Federal Food, Drug & Cosmetic Act (FD&C) §342. This product complies with Annex 7 of PE009-13, the PIC/S guide to GMP for medicinal products with specific reference to Adulteration or substitution of herbal substances in relation to this Guarantee. This extract of *Panax ginseng* does not contain any plant part other than root and does not contain any other plant species.

Everybody's doing it!

HORSEGATE

Honeygate

#Dieselgate

SUPPLEMENTGATE?

Take home points!

- Elimination of risk must be centric to QC
- Technical staff must be across latest science
- Avoid the mob mentality

Homework

- Does your risk mitigation plan address all known risks?
- Are you 100% certain your consumer is getting only what they see on the label?
- Are you free from recourse in the event of SupplementGate?

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Thank you!

Discussion Time!

rgorman@imcd.com.au