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LEMON FROM SPAIN

Processing Factors (PF) for Pesticide Residues in Cold Pressed Lemon OIL

José-Antonio García. AILIMPO

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LEMON FROM SPAIN

Interprofessional Association representing the Spanish Lemon and Grapefruit industry officially recognized by:

Spanish Ministry of Agriculture

GOBIERNO DE ESPAÑA
MINISTERIO DE AGRICULTURA Y PESCA, ALIMENTACIÓN Y MEDIO AMBIENTE

European Commission

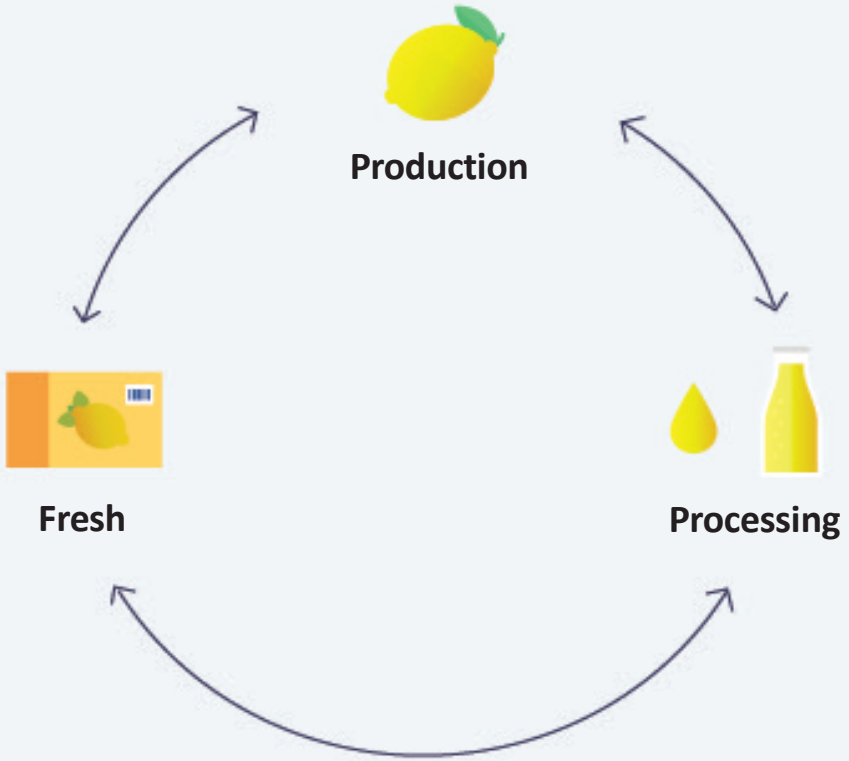
Ailimpo is member of:

freshfel
EUROPEAN FRESH PRODUCE ASSOCIATION

EFEO
European Federation of Essential Oils

World Citrus Organisation

Representing all the value chain



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World Citrus Organisation

- **Discuss** common issues affecting citrus producing countries.
- **Exchange** information on production and market trends.
- **Foster** dialogue on policy issues of common concern.
- **Identify** and promote Research and Innovation projects specific to the citrus sector.
- **Liaise** with public and private stakeholders on citrus-related matters to highlight the importance of citrus producers and the need for a fair return.
- **Promote** the global consumption of citrus.

WCO Northern Hemisphere Co-Chair

Spain
Ailimpo - José Antonio Garcia Fernández

WCO Southern Hemisphere Co-Chair

South Africa
Citrus Growers' Association - Justin Chadwick

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WCO Membership

WCO Associated Members

ABCM – Associação Brasileira de Citrus de Mesa (Brazil)

Ailimpo – Asociación Interprofesional de Limón y Pomelo (Spain)

AKIB – Mediterranean Fresh Fruit and Vegetables Exporters Association (Turkey)

Chilean Citrus Committee (Chile)

Citrus Australia (Australia)

Citrus Growers' Association (South Africa)

Fruitimprese (Italy)

Groupement Interprofessionnel des Fruits (Tunisia)

Moroccan Interprofessional Citrus Federation – Maroc Citrus (Morocco)

Plant Production Marketing Board (Israel)

Procitrus – Asociacion de Productores de Citricos del Peru (Peru)

Upefruy – Unión de Productores y Exportadores de Fruta del Uruguay (Uruguay)

WCO Associated Members

AgroFresh (Spain)

AM FRESH Group (Spain)

Apeel Sciences (USA)

Classic Harvest (USA)

ClemenGold (South Africa)

Easyfresh Logistics (Spain)

FMI (Netherlands & Spain)

FruitOne (South Africa)

G.F. Marketing (South Africa)

Janssen Preservation and Material Protection (Belgium)

MAFA-Magrabi Agriculture (Egypt)

Morocco Foodex (Morocco)

Naturipe (USA)

Oranfrizer (Italy)

PCN (USA)

River Front Packing (USA)

San Miguel Global (South Africa)

Total Citrus (Bolivia)

Wonderful Citrus (USA)

Zalar Agri – Agricole Centre (Morocco)

World Citrus Organisation

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LEMON FROM SPAIN

Spanish lemon in the world 2021

Spain

2nd World producer

1,375,000 tonnes

Fresh
70-75%

Processing
25-30%

World total
6,615,000 tonnes

Fresh

Spain

22%
of world output
960,000 tonnes

1st

Processing

Spain

17%
of world output
415,000 tonnes

2nd

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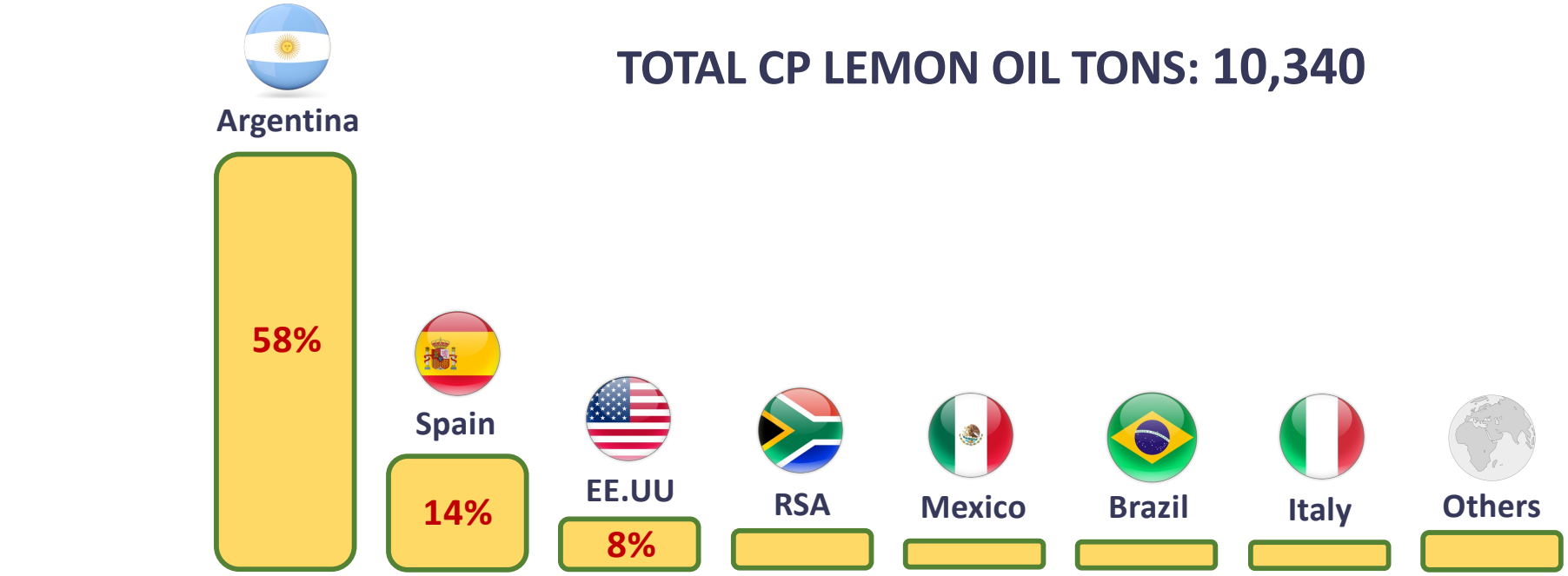
LEMON FROM SPAIN

Average CPLO Production in the world 2021

TOTAL CP LEMON OIL TONS: 10,340



CP LEMON OIL (TONS)	6,000	1,453	840	630	350	280	263	525

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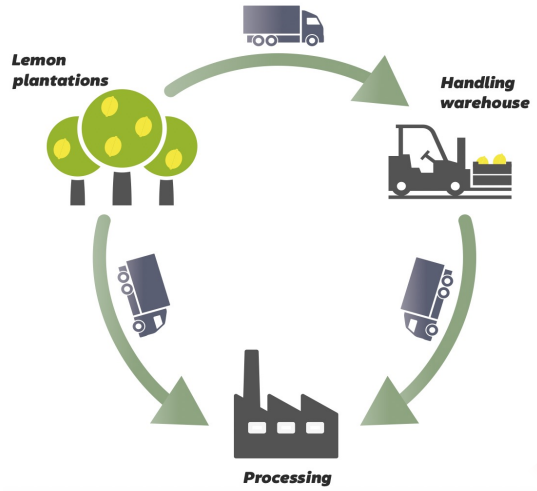
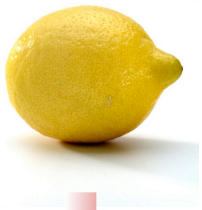
LEMON FROM SPAIN

ORCHARD - PACKING HOUSE - PROCESSING





INCREASING QUANTITIES SENT DIRECTLY FROM ORCHARD TO PROCESSING

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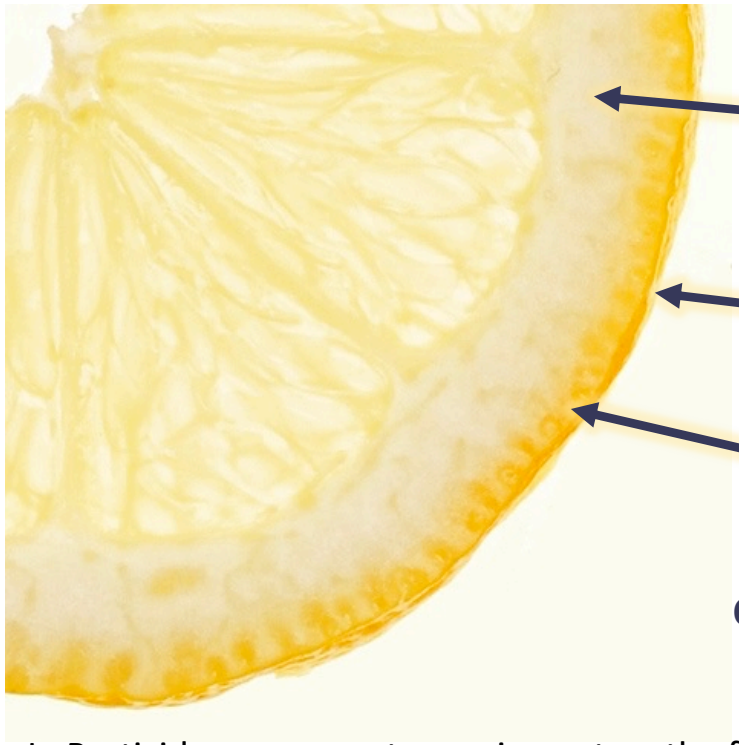
LEMON FROM SPAIN

Pre and Post Harvest Treatments According to Regulation



Albedo
(white portion, spongy)

Flavedo
(lemon skin)
yellow portion

Oil Glands

Concentrating legal pesticide residues in the very external peel of lemons.

In Pesticides presence terms, impact on the final product is very limited as quantity of CP Lemon Oil added in final product for consumers is quite small… *REAL DIMENSION OF THE ISSUE…*

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Why do we use pesticides?

We have to comply with fresh trading standards and retailers quality (external appearance) requirements

We need to reduce production losses (in quantity and quality) caused by…. Pests and diseases

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LEMON FROM SPAIN

THE SPANISH APPROACH TO PESTICIDE RESIDUES ON CPLO

1. **STRATEGY TO REDUCE THE USE OF PESTICIDES IN SPAIN:**
   - **(1) MANDATORY PLAN APPROVED BY THE EUROPEAN UNION**
   - **(2) INTERNAL EFFORTS FROM THE INDUSTRY ITSELF**

2. **PROCESSING FACTOR CALCULATION**

3. **AVOIDING POSTHARVEST RESIDUES PROCESSING FRUIT DIRECTLY FROM THE ORCHARDS**

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LEMON FROM SPAIN

A European Green Deal

Striving to be the first climate-neutral continent

European Commission

From Farm to Fork:

Our food, our health, our planet, our future

The European Green Deal

European Commission

EU BIODIVERSITY STRATEGY

Bringing nature back into our lives

The use of pesticides in agriculture contributes to pollution of soil, water and air. The Commission will take actions to:

- ✓ **reduce by 50%** the use and risk of chemical pesticides by 2030.
- ✓ **reduce by 50%** the use of more hazardous pesticides by 2030.

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LEMON FROM SPAIN

European Commission

Reducing the risk and use of pesticides

- **Legally binding targets** reducing the use and risk of chemical pesticides by 50% by the year 2030.
- **Environmentally friendly pest control** ensuring all farmers practice Integrated Pest Management in which chemical pesticides are used only as a last resort.
- **Promoting low-risk alternatives** with national targets to increase non-chemical methods of pest control and sales of non-chemical plant protection products.
- **Accelerating approvals** of biological alternatives for farmers and other pesticide users.
- **Enabling the use of new technologies** such as precision farming, which contributes to further reducing the use of chemical pesticides.
- **Helping farmers access required advice and guidance** for more sustainable farming with less chemical pesticides.

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LEMON FROM SPAIN

RECOMMENDATIONS TO MINIMAZE PRE AND POSTHARVEST TREATMENTS

Integrated Pest Management (IPM)

IPM is one of the tools for low-pesticide-input pest management including biological pest control and must be implemented by all professional users

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LEMON FROM SPAIN

BOOSTING THE USE OF NATURAL PREDATORS: TAKING CARE OF BATS

Analysis of bat diet

BATS are a relevant relevant actor in the fight against lemon tree pests in SPAIN

CONSERVATION STATUS ASSESSMENT OF THE **LONG-FINGERED BAT (*Myotis capaccinii*) IN THE IBERIAN SOUTHEAST**

Phyllocnistis citrella

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LEMON FROM SPAIN

AILIMPO LEADING PROJECTS (3)

(1) BIOSERECO PROJECT "Integrated management of biodiversity in agricultural environments to obtain ecosystem services." **To restore biodiversity to improve pest control and pollination**

Installation of plant structures for:

- Habitats for natural enemies for biological pest control
- Reduce the use of pesticides

(2) BLOCKCHAIN PROJECT "LEMONTRACE"

Traceability to guarantee quality and safety

(3) SAFEOILS PROJECT

Promoting Good Agriculture Practices for a sustainable use of pesticides

GO SAFEOILS

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LEMON FROM SPAIN

Pesticides Processing Factors (PF´s) CPLO

- Situation >> Uncertainty and B2B Disputes
- The Way Forward
- PF calculation for 11 Pesticides
- Other Pesticides Regression Equation considering Log Pow
- Other Challenges

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LEMON FROM SPAIN

Situation >> Absence of harmonized PF creates Uncertainty and B2B Disputes

- European/Spanish CP Lemon Oil Producers must prove legal compliance of their products: we can prove that raw material (fresh lemons) complies with Regulation…. BUT… Clients demand for more.
- Grey / Black area around pesticide residues in B2B contract specifications >> Distortion of the market.
- In many cases the pesticide residues are not detectable in Fresh Lemons (<0,01 mg/kg) but due to concentration are unfortunately detected in the CPLO.
- Laboratory Analysis Level of Uncertainty (+- 50%)

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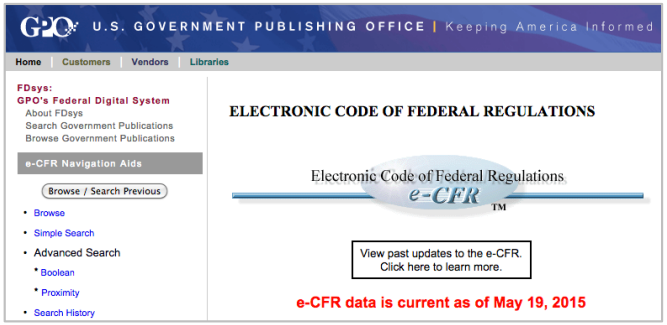
Some PF for CPLO available worldwide … but insufficient and not harmonised



CODEX ALIMENTARIUS
International Food Standards
World Health Organization
Food and Agriculture Organization of the United Nations

- CODEX: PF Only for Boscalide

PROCESSING FACTOR COMPARISON

NETHERLANDS VS USA VS CANADA

ACTIVE SUBSTANCE	NETHERLANDS	USA	CANADA
Abamectin	6,9	5	--
Acequinocyl	--	150	85,714
Cyfluthrin	5,3	1,5	--
Cypermethrin	1	11,429	--
Chlorpyrifos	11	20	--
Difenoconazole	47	41,667	--
Espinetoram	115	10	30
Fenpyroximate	13	20	--
Fluazifop-P-butyl	1	1000	--
Imazalil	13,3	20	--
Methoxyfenozide	42,5	33,333	10
Phenbutatin Oxide	6,96	7	--
Pyridaben	25,3	20	--
Pyrimethanil	--	13,636	15

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THE LEMON FROM SPAIN® WAY FORWARD

- **A SENSITIVE TOPIC: Better to be PROACTIVE rather than REACTIVE**
- **PRIORITY: eliminating uncertainty calculating a PF with ROBUST DATA**
- **PRACTICAL APPROACH: A Study**
  - **Following EU OFFICIAL GUIDELINES to be validated**
  - **Collaborating and informing other stakeholders within the industry: EFEO, IFEAT, EFFA… now here in the ICBC**
  - **Inviting the industry for a global commitment/solution**

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LEMON FROM SPAIN

PF COLD PRESSED LEMON OIL STUDY RESULTS FOR 11 ACTIVE SUBSTANCES

	Mean PF AILIMPO data	EU MRL (lemon RAC) mg/kg	MRL det lemon oil mg/kg
Chlorpyrifos *	161	0,01	1,61
Chlorpyrifos-methyl *	58	0,01	0,58
2-Phenylphenol	71,4	10	714
Pyriproxyfen	121,7	0,6	73,02
Pyrimethanil	56	8	448
Propiconazole *	58,4	5	292
Imazalil	2,6	5	13
Prochloraz *	31,9	0,03	0,957
Thiabendazole	0,8	7	5,6
Hexythiazox	34	1	34
Metalaxyl/Metalaxyl-M	4,5	0,5	2,25

Lemon oil PF available from the AILIMPO study vary widely between active substances. It is therefore not considered feasible to derive a single or generic lemon oil PF for all pesticide active substances.

(*) Authorised substances when the study was made

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LEMON FROM SPAIN

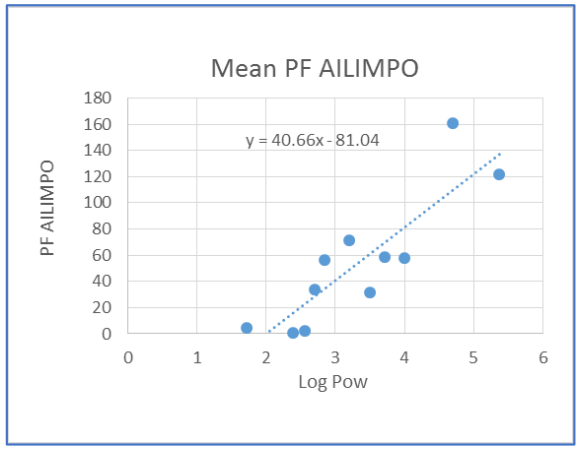
FOR OTHER PESTICIDES
A PRACTICAL APPROACH BASED ON OCTANOL/WATER PARTITION COEFFICIENT (Log Pow)

Theoretical lemon oil processing factors can be calculated using the regression equation from the AILIMPO processing data study (y = 40.66x – 81.04) where X=Log Pow

Based on the data from AILIMPO study it is concluded:

>> **For substances with a log Pow of 3 or greater**, log Pow is a useful indicator of the expected concentration of pesticide residue in lemon oil **using the regression equation**

>> **For water soluble substances with a log Pow <3**, the concentration of residue in lemon oil is generally small and cannot accurately be predicted via log Pow >> if no experimental data are available, a **generic PF of 2 may be used.**



	Log Pow	Mean PF AILIMPO
Chlorpyrifos	**4.7**	161
Chlorpyrifos-methyl	**4**	58
2-Phenylphenol	**3.2**	71.4
Pyriproxyfen	**5.37**	121.7
Pyrimethanil	**2.84**	56
Propiconazole	**3.72**	58.4
Imazalil	**2.56**	2.6
Prochloraz	**3.5**	31.9
Thiabendazole	**2.39**	0.8
Hexythiazox	**2.7**	34
Metalaxyl /Metalaxyl-M	**1.71**	4.5
Linear regression equation		**y = 40.66x – 81.04**
Correlation coefficient r^2		0.75
Significance / F-value		0.0006

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LEMON FROM SPAIN

CPLO PF CALCULATED BY AILIMPO: OFFICIAL VALIDATION

↘ SPANISH GOVERNMENT: MINISTRY OF HEALTH

https://www.aesan.gob.es/AECOSAN/docs/documentos/seguridad_alimentaria/gestion_riesgos/aceite_limon.pdf

GOBIERNO DE ESPAÑA MINISTERIO DE CONSUMO

agencia española de seguridad alimentaria y nutrición

↘ EUROPEAN COMMISISON

https://food.ec.europa.eu/system/files/2018-03/sc_phyto_20180226_ppr_sum.pdf

EUROPEAN COMMISSION

Health and Food Safety Directorate General

sante.ddg2.g.5(2018)1450427

Standing Committee on Plants, Animals, Food and Feed
Section *Phytopharmaceuticals - Residues*
26-27 February 2018

SUMMARY REPORT

A.30 AOB

- Processing factors in cold pressed lemon oil

The point was added to the agenda by the chair on request of Spain.

New studies have been submitted by a national association of producers of cold pressed lemon oil which demonstrate the safe application of certain processing factors for 11 substances. Spain, who had received the studies, suggested that those processing factors should be taken into consideration also by other national authorities. The Commission invited the other Member States to take those studies into account if considered appropriate.

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MORE IN DEPTH… EU INFORMATION NOTE ON PF (FEBRUARY 2022)

EUROPEAN COMMISSION
HEALTH AND FOOD SAFETY DIRECTORATE-GENERAL

Food and feed safety, innovation
Pesticides and Biocides

Brussels, 22/02/2022
SANTE/ 10704/2021

Information note on Article 20 of Regulation (EC) No 396/200[illegible] as regards processing factors, processed and composite food and feed[1]

<u>It clarifies 2 points that are of particular importance to the entire value chain:</u>

- **If the raw material complies with the corresponding MRLs, then all processed intermediate products derived from it and subsequently incorporated into a final product/foodstuff are equally to be considered compliant.**

- **Processing factors are applicable to all plant protection products (both approved and non-approved as per the EU Pesticides Database).**

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FUTURE CHALLENGES (1)>> Global Harmonization

Harmonization is a must: Official level and/or Industry agreement

FUTURE CHALLENGES (2)>> defining appropriate transitional periods

A more practical and realistic transition period following the delayed applicability for processed and longer shelf-life commodities is called for

FUTURE CHALLENGES (3)>> Laboratory analysis Level of uncertainty (+- 50%)

REPORT OF PESTICIDE RESIDUE ANALYSIS

DETECTED PESTICIDE RESIDUES SUMMARY	Result ± U (mg/kg)	Rec. (%)	LoQ (mg/kg)
2-Phenylphenol	8,0 ± 4,00	89	0,01
Etoxazole	0,046 ± 0,0232	95	0,01
Fenitrothion	0,016 ± 0,0080	108	0,01
Fludioxinil	7,6 ± 3,80	96	0,01
Hexythiazox	0,039 ± 0,0195	100	0,01
Imazalil	0,100 ± 0,0499	96	0,01
Metalaxyl	0,011 ± 0,0054	92	0,01
Pyrimethanyl	7,2 ± 3,62	87	0,01
Pyriproxyfen	2,2 ± 1,08	93	0,01
Propiconazole	0,013 ± 0,0064	91	0,01
Propyzamide	0,056 ± 0,0282	84	0,01

Uncertainty (U) is expressed with a coverage factor equal to 2 (95% confidence). LoQ: Limit of Quantification.
Result (mg/kg) corrected for the recovery factor when the recovery is less than 80% or greater than 120%.

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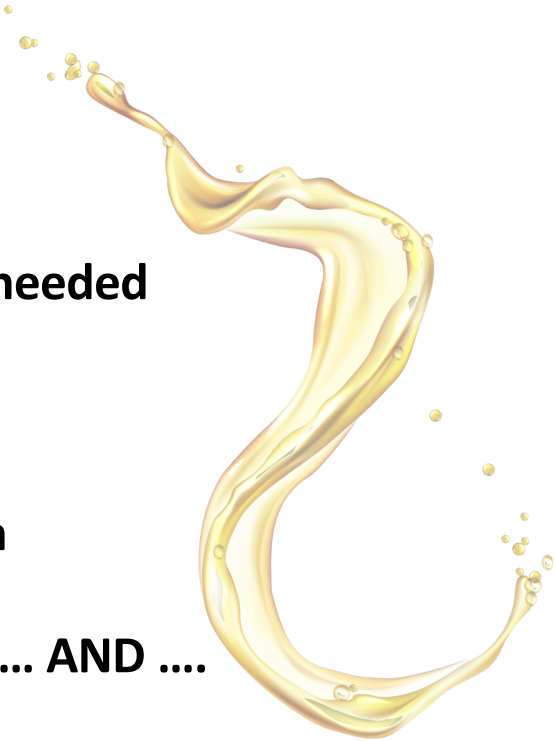
CONCLUSSIONS & HIGHLIGHTS

- Spain as a KEY LEMON PLAYER worldwide.
- Pesticides in CPLO is a sensitive topic >> Harmonization needed
- SPAIN decided to be PROACTIVE rather tan REACTIVE
- FRESH Market is the driver of Lemon production in Spain
- Use of Pesticides is essential to keep the business model… AND ….



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LEMON FROM SPAIN

CONCLUSSIONS & HIGHLIGHTS

- **EUROPE´s OFFICIAL NEW STRATEGIES promote a reduction of use of pesticides**
- **The SPANISH industry is committed with this goal**
- **A robust Study calculates PF for 11 active substances**
- **For other substances PF can be fixed according to Log Pow**
- **Finally, remember that impact on the final product is very limited as quantity of CP Lemon Oil added in final product for consumers is quite small… *REAL DIMENSION OF THE ISSUE…***