DISCUSSION PAPER ON THE EVALUATION OF DISTRIBUTION OF PESTICIDE RESIDUES AFTER PRIMARY PROCESS IN CITRUS FRUIT, POME FRUIT, OILSEEDS AND WINE GRAPES

EU Community Reference Laboratory for Pesticide Residues in Fruits and Vegetables

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OECD/OCDE

508 Adopted:3 October 2008

OECD GUIDELINE FOR THE TESTING OF CHEMICALS

Magnitude of the Pesticide Residues in Processed Commodities

PURPOSE

2. Studies on the magnitude of residues in processed commodities provide data on the transfer of residues to different processed commodities from the raw agricultural commodity (RAC). Studies on the magnitude of residues are conducted in order to quantify levels of residues in processed commodities and to provide the distribution of residues (active ingredient, and/or metabolites, degradation products) in various processed products resulting from the processing of a commodity. This information about dilution and concentration of residues and the estimation of processing factors (the ratio of residue levels in processed commodities to those in the raw agricultural commodity) is used to:

- conduct refined dietary exposure assessments with primary processed products to assess consumer safety;
- provide results on residues in commodities that may be used as animal feedstuffs and thus to allow a more realistic calculation of the dietary burden of livestock;
- establish MRLs for processed commodities; and
- monitor compliance with the RAC MRL.

8. The processing factor (Pf) that originates only from residues of the same single compound in the RAC is calculated as follows:

$$Pf = \frac{\text{residue level in processed commodity}}{\text{residue level in the RAC or commodity to be processed}}$$

14. Important conclusions concerning the behaviour of the active ingredient and/or metabolites during processing can be drawn from the distribution coefficients for n-octanol/water, hydrolysis stability, heat stability and solubility behaviour. For example, when the log Pow is greater than three, it can be assumed that the residue will likely be concentrated in oil or solids like meal, whereas high water solubility indicates that residues may be expected in juices. For example: the extremely high potential concentration factors for citrus oil (Pf = 1000) and mint oil (Pf = 330) should be considered.

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OECD GUIDANCE DOCUMENT ON MAGNITUDE OF PESTICIDE RESIDUES IN PROCESSED COMMODITIES

Study Number	Commodity	Thiacloprid (mg/kg)	Pf
1	Tomato (RAC)	0.24	-
	Paste	0.48	2.0
2	Tomato (RAC)	0.07	-
	Paste	0.22	3.1

The mean processing factor for tomato paste, 2.6, may be used for both monitoring (enforcement) and dietary exposure assessment considerations.

Thiacloprid: Pkow = 1.26; water solubility= 185 mg/L

Further Consideration of Processing as Related to the Establishment of MRLs for Processed Foods: Recommendations on Principles and Practices

Prepared by the USA and the EC

1. Processing studies should be mandatory for a short list of commodities (about 16 at that time). Proposed MRLs for the relevant raw agricultural commodities may not advance to Step 8 without processing studies deemed acceptable by the JMPR.
2. CXLs or processing factors should be established for those processed commodities where a significant increase (>1.3 times) of residue of concern occurs from the RAC to the processed commodity. It should be decided in advance for which commodities and for which processing factors, they will be established
3. CXLs or processing factors should be established for processed commodities where a significant decrease in residue occurs from RAC to processed commodity *and* the processing factor must be considered in order to achieve a satisfactory dietary exposure assessment. It should be decided in advance for which commodities and for which processing factors they will be established
4. A limited number of generic default processing factors should be established for some predefined common processes, such as dehydration. These would be useful for risk assessment purposes.

1. Mandatory Processing Studies

The need for a processing study is based on a consideration of the 5 factors above. A series of large industrial scale processes are listed, and studies are usually considered essential for these processes. These processes include the preparation of:

- fruit juice (and byproducts)
- alcoholic beverages (such as fermentation, malting, brewing, distillation)
- vegetable juices
- oils
- milling fractions
- silage (livestock only)
- sugar

Further Consideration of Processing as Related to the Establishment of MRLs for Processed Foods: Recommendations on Principles and Practices

Prepared by the EC and the USA

Commodities with Established Dehydration Factors

Raw agricultural commodity	Processed product	Dry matter content in RAC	Dry matter in dried product	Theoretical processing factor
FT 0297 Figs	Fruit, dried	22%	74%	3.4
FB 0269 Grapes	Fruit, dried	18%	85%	4.7
Grass	Hay	20%	86%	4.3
FS 0014 Plums	Prunes	20%	70%	3.5
FP 226 Apple	Fruit, dried	17%	68%	4.0
FS 240 Apricot	Fruit, dried	14%	69%	4.9
FP 230 Pear	Fruit, dried	16%	73%	4.6
VO 448 Tomato	Tomato, sun dried	6.1%	85%	14
VO 445 Peppers Sweet	Sweet pepper, dry	9%	92.9%	10
VO 444 Peppers chili	Chili pepper, dry	13%	92.9%	7

APPLE JUICE

ORANGE JUICE


GRAPE WINE

OLIVE OIL

Thiabendazole Distribution

1000 g Orange
1 mg pesticide
1 mg/kg

330 g Juice (33%)
0.03 mg pesticide (3%)
0.09 mg/kg

670 g Wet Pomace (67%)
0.96 mg pesticide (96%)
1.43 mg/kg

420 g Pulp (42%)
0.13 mg pesticide (13%)
0.31 mg/kg

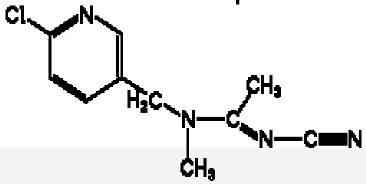
250 g Peel (25%)
0.81 mg pesticide (81%)
3.24 mg/kg

<table>
<tr><th colspan="2">Thiabendazole
pKow=2.4</th><th colspan="2">Pesticide Distribution
%</th><th colspan="2">Mass
(g)</th><th colspan="2">Pesticide Mass
(mg)</th><th colspan="2">Pesticide Concentration
(mg/kg)</th></tr>
<tr><td colspan="2">Orange</td><td colspan="2">100</td><td colspan="2">1000</td><td colspan="2">1</td><td colspan="2">1</td></tr>
<tr><td colspan="2">Juice</td><td colspan="2">3</td><td colspan="2">330</td><td colspan="2">0.03</td><td colspan="2">0.09</td></tr>
<tr><td rowspan="2">Wet Pomace</td><td>Pulp</td><td rowspan="2">96</td><td>13</td><td rowspan="2">670</td><td>420</td><td rowspan="2">0.96</td><td>0.13</td><td rowspan="2">1.43</td><td>0.31</td></tr>
<tr><td>Peel</td><td>81</td><td>250</td><td>0.81</td><td>3.24</td></tr>
</table>

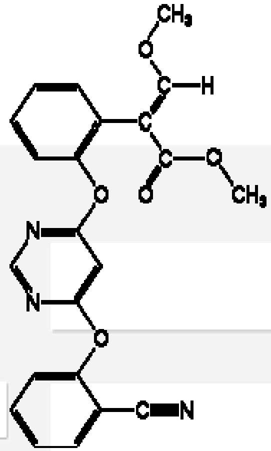
EXPERIMENTAL

PESTICIDES USED

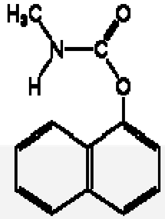
Acetamiprid



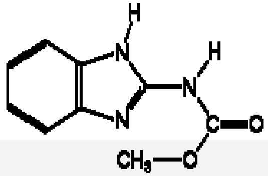
Azoxystrobin

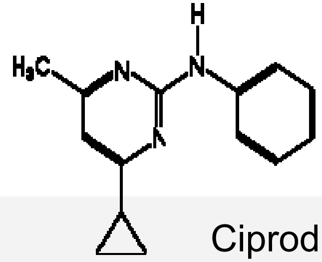


Carbaryl

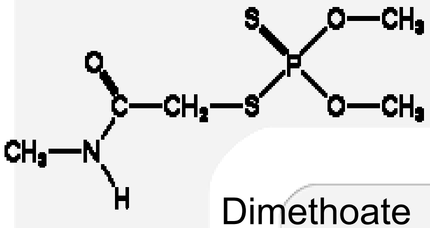


Carbendazim



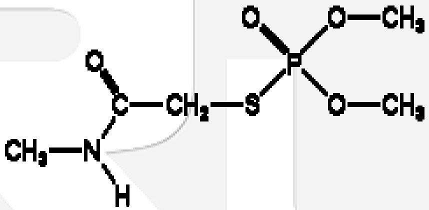


Ciprodinil

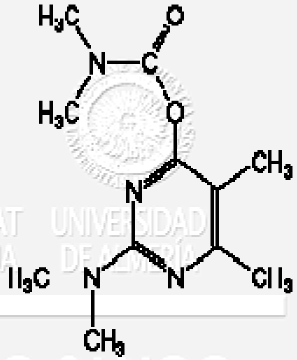


Dimethoate

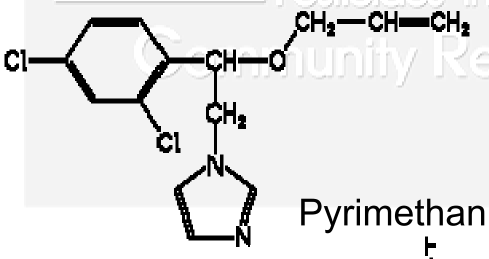
Omethoate



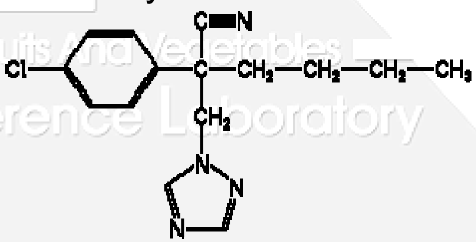
Pirimicarb

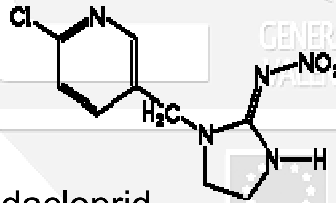


Imazalil



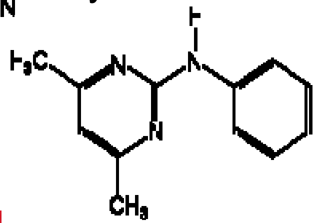
Myclobutanil



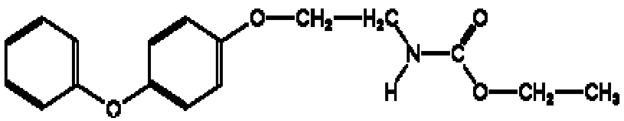


Imidacloprid

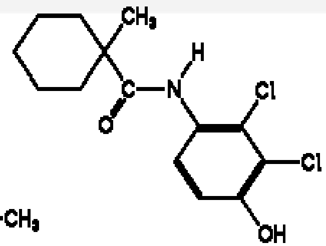
Pyrimethanil



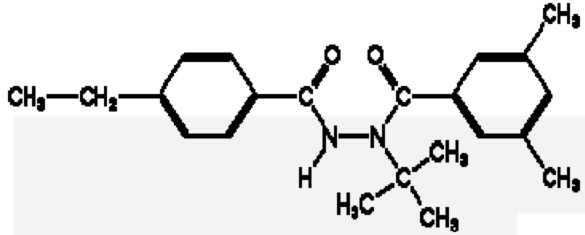
Fenoxycarb



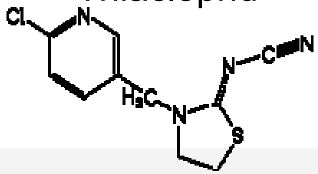
Fenhexamid



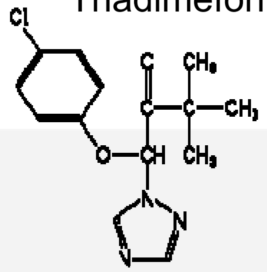
Tebufenozide



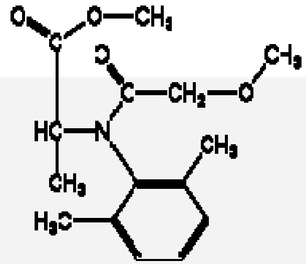
Thiacloprid

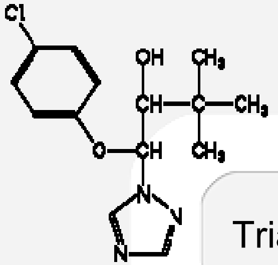


Triadimefon

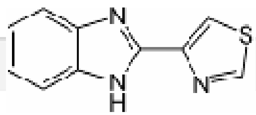


Metalaxyl





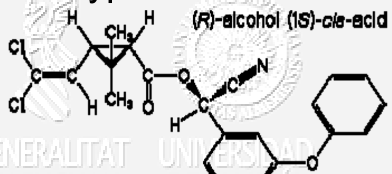
Triadimenol



Thiabendazol

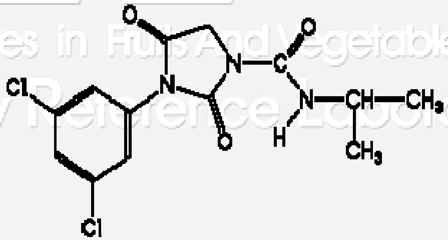
β-Cyfluthrin

α-Cypermethrin

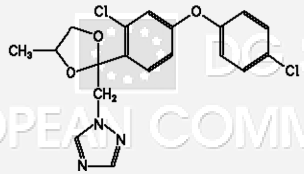


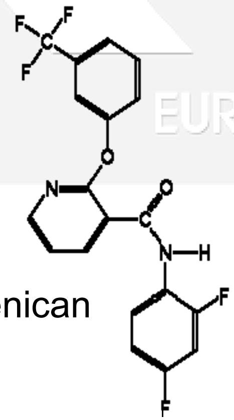
Endosulfan sulfate

Iprodione



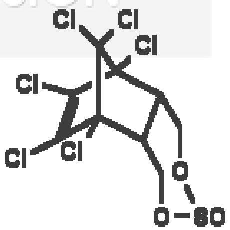
Difenoconazole



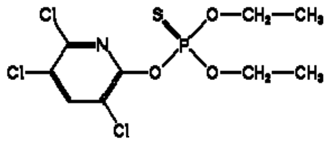


Diflufenican

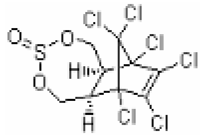
β-Endosulfan



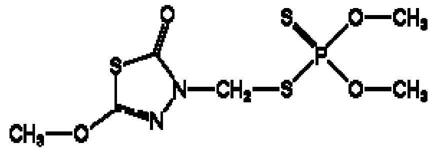
Chlorpyrifos



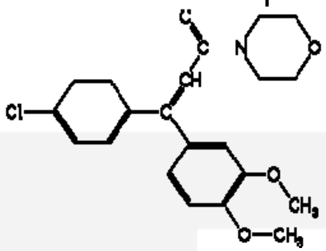
α-Endosulfan



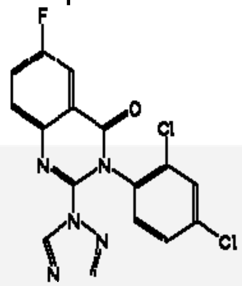
Methidathion



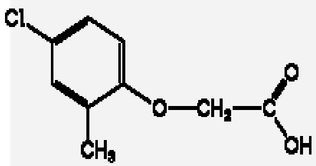
Dimethomorph



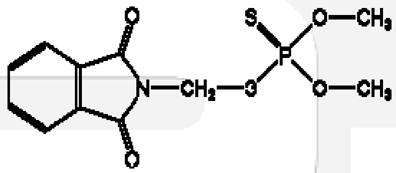
Fluquinconazole



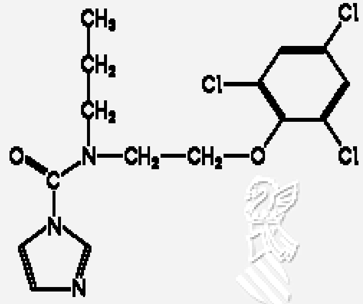
MCPA



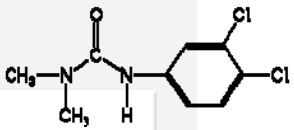
Phosmet



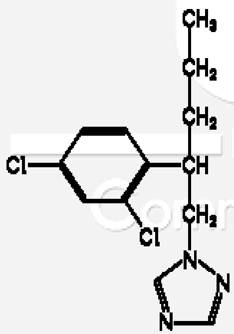
Prochloraz



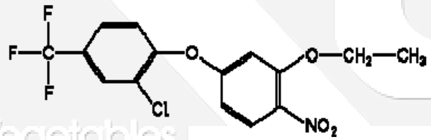
Diuron



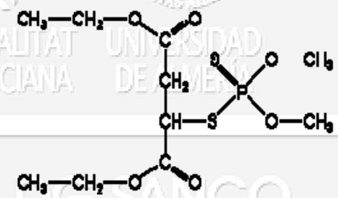
Penconazole



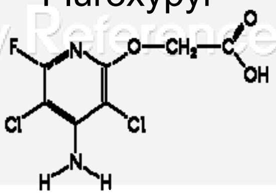
Oxyfluorfen



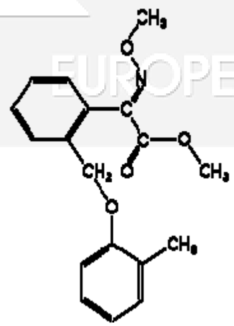
Malathion



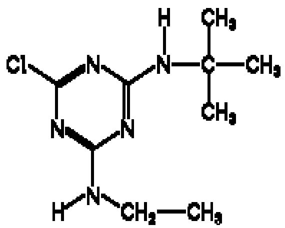
Fluroxypyr



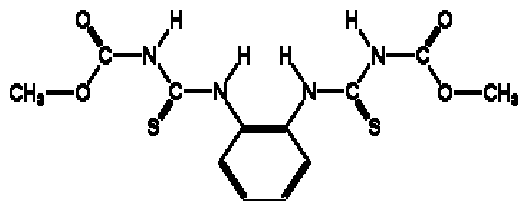
Kresoxim-methyl



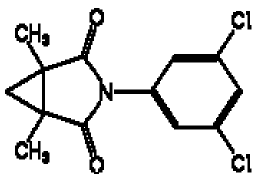
Terbuthylazine



Thiophanate-methyl



Procymidone

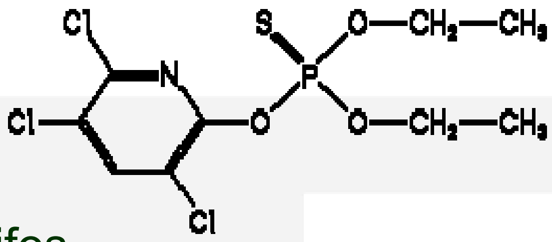


Grapes	
Pesticide	**Log Kow**
Imidacloprid	0,57
Dimethoate	0,7
Acetamiprid	0,8
Carbendazima	1,51
Carbaril	1,85
Thiabendazol	2,39
Azoxystrobin	2,5
Dimethomorf	2,7
Procymidone	3,14
Kresoxim methyl	3,4
Penconazole	3,72
Imazalil	3,82
Ciprodynil	4

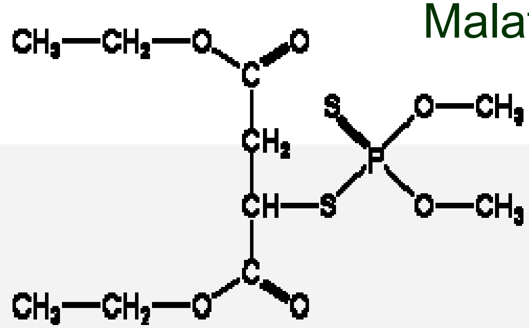
Olives	
Pesticide	**Log Kow**
MCPA	-0.71
Methidathion	2.2
Malathion	2.75
Diuron	2.85
Phosmet	2.95
Terbuthylazine	3.21
Difenoconazole	4.2
Oxyfluorfen	4.47
Chlorpyriphos	4.70
a-Endosulfan	4.74
β-Endosulfan	4.79
Diflufenican	4.9
β-Cyfluthrin	5.9
a-Cypermethrin	6.6

Apple and Orange	
Pesticide	**Log Kow**
Dimethoate	0.7
Omethoate	-0.74
Acetamiprid	0.8
Thiacloprid	1.26
Carbendazim	1.5
Pirimicarb	1.7
Metalaxyl	1.75
Carbaril	1.85
Thiabendazole	2.4
Azoxystrobin	2.5
Pyrimethanil	2.84
Myclobutanil	2.94
Iprodione	3.0
Triadimenol	3.08, 3.28
Triadimefon	3.11
Fluquinconazole	3.24
Fenhexamid	3.51
Fenoxicarb	4.07
Tebufenozide	4.25
Imazalil	4.6

Olives

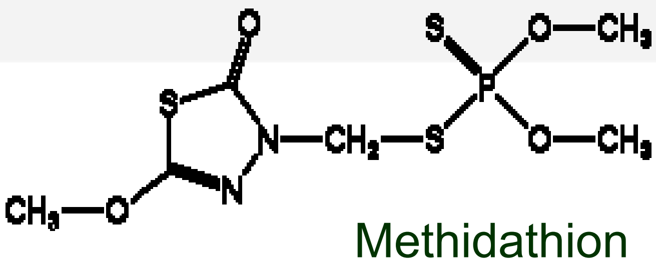


Chlorpyrifos

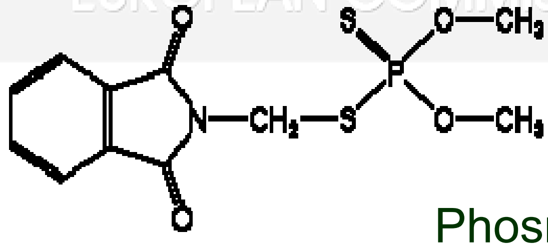


Malathion

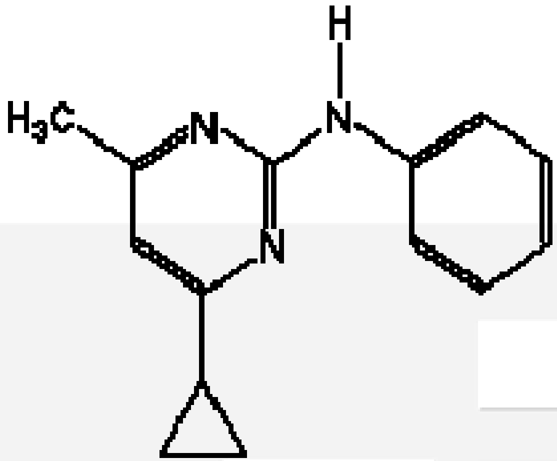
Pesticide	pKow	S_w (mg/L)
Chlorpyrifos	4.70	1.40
Malathion	2.75	145
Methidathion	2.20	200
Phosmet	2.95	25



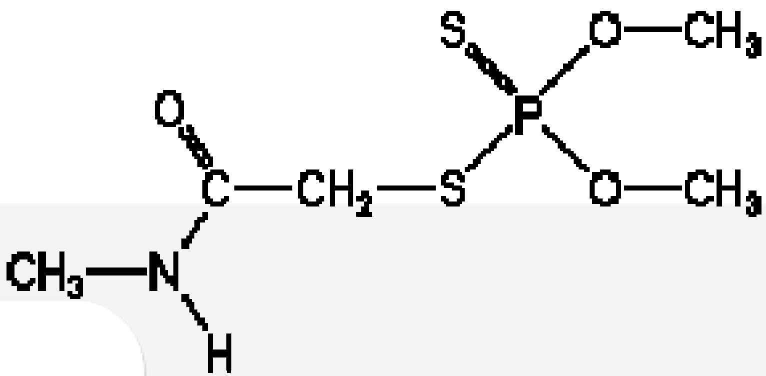
Methidathion



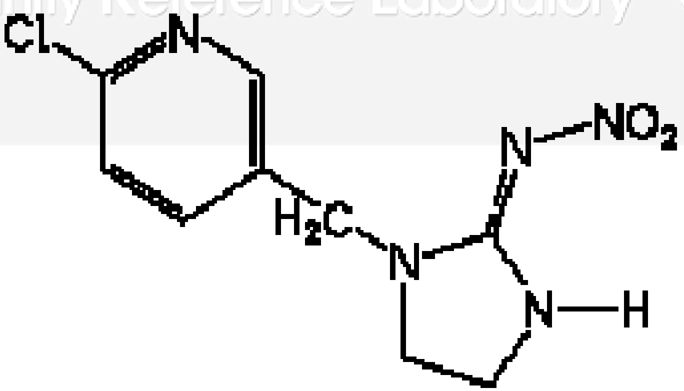
Phosmet



Pesticida	Log Kow	S_w (mg/L)
Ciprodinil	4	13



Pesticida	Log Kow	S_w (mg/L)
Dimetoato	0.7	23800



Pesticida	Log Kow	S_w (mg/L)
Imidacloprid	0.57	610

Apple

	Recommended Dose	Elapsing Time (days)	MRL (mg/kg) Reg. (EC) No 396/2005	Status under Directive 91/414/EEC	Dose in fruit (mg/kg) estimation
Acetamiprid	25-35% (20% p/p)	14	0.1	Included	7
Azoxystrobin			0.05	Included	
Carbaryl	100-200g/hl (85% p/v)	7	0.05	Not included	1.7
Carbendazim	60g/hl (50% p/v)	15	0.2	Included	3
Dimethoate			0.02	Included	
Fenhexamid			0.05	Included	
Fenoxycarb	0.2-0.3% (25% p/p)	21	1	Not included	15
Imazalil	125 cc/hl (34% p/v)	30	2	Included	4
Iprodione	0.15-0.23% (50%p/v)	21	5	Included	75
Metalaxil			1	Not included	
Myclobutanil	0.04-0.05% (12.5% p/v)	28	0.5	Not included	6
Omethoate			0.02	Not included	
Pirimicarb	0.1% (50% p/p)	7	2	Included	50
Pyrimethanil	0.75-1 l/ha	28	5	Included	8
Tebunofenozide	0.075% (24% p/v)	Not applicable	1	Not included	2
Thiabendazol	0.15-0.2% (60% p/v)	Not applicable	5	Included	2
Thiacloprid	0.025-0.03% (48% p/v)	14	0.3	Included	3
Triadimefon	50cc/hl (25% p/v)	15	0.2	Not included	0.5
Triadimenol	50cc/hl (25% p/v)	15	0.2	Included	0.5

Juice processing

Imazalil
Thiophanate methyl
Thiabendazole
Prochloraz

1016 g

332 g (33%)

675 g (67%)

Solid Residue

Amadeo R. Fernández-Alba
CRL-FV

Postharvest treatment

aprox.1 ppm

Imazalil
Thiophanate methyl
Thiabendazol
Prochloraz

1630 g

389 g (24%)

1241 g (76%)

Introduction

- **Wine process**

80 mg/L SO_2
0.5 L fermented must

Grape → Destemmer/crusher → Crushed

Stems

Maceration (Fermentation) 10 days

Pressing

Grape Pomace

Must

Fermentation 10 days

Sediment

Wine

Introduction

- **Wine process**

Wine

Bentonite
Gelatine

Clarified Wine

Lees

5 L

Introduction

- **Wine process**

Grape

Crushed

Crushed after fermentation

Grape pomace

Must

Sediment

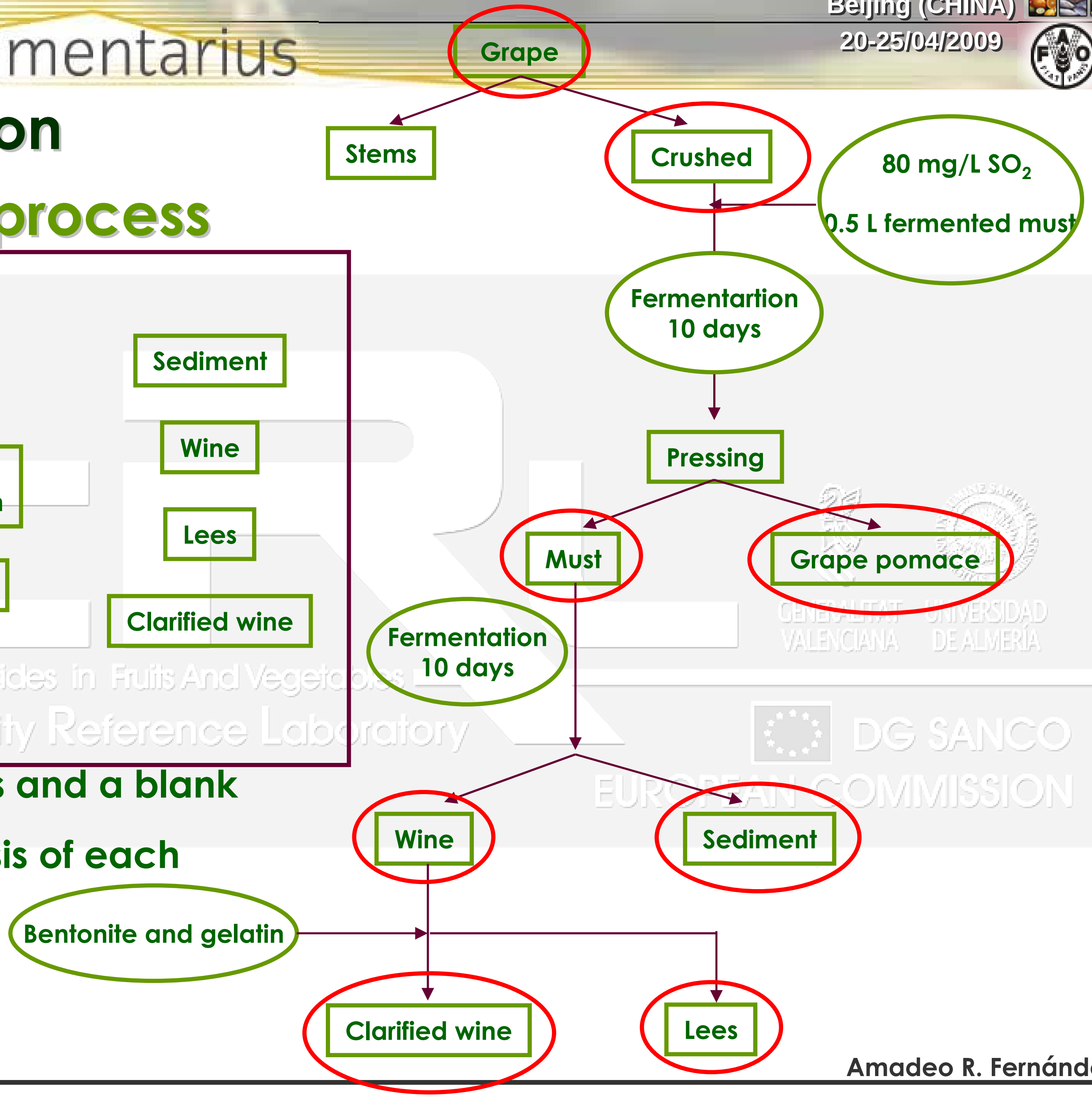
Wine

Lees

Clarified wine

5 replicates and a blank

3 analysis of each



Introducción

- Pesticidas

Fungicidas

- Azoxystrobin
- Carbendazima
- Ciprodynil
- Dimethomorf
- Imazalil
- Kresoxim methyl
- Penconazole
- Procymidone
- Thiabendazol

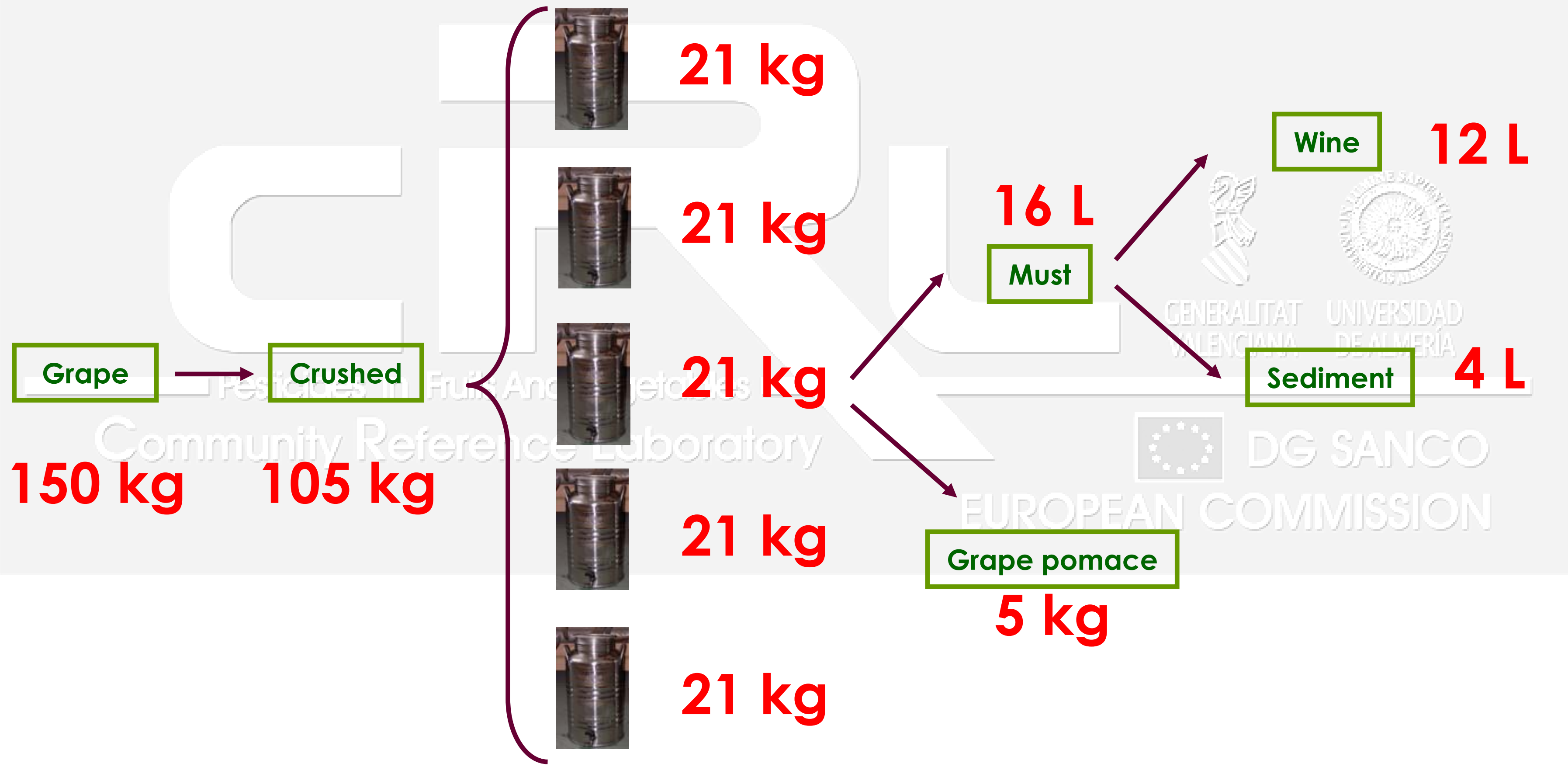
Insecticidas

- Acetamiprid
- Carbaril
- Dimethoate
- Imidacloprid

Introduction

- Wine process

Mass balance

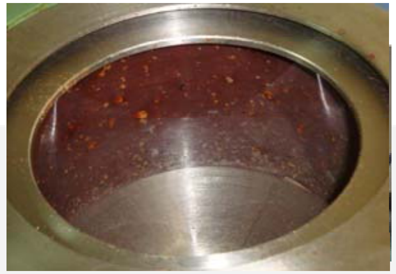


Olive Oil Process

Olive Paste

100mL of water are added

30 min. stirring



Centrifuge it for 1 min

The rest is the **Alpechin**

Olive Pomace

Gravity decantation

15 min. centrifuge at 3500rpm

Supernatant **Olive Oil**

RESULTs

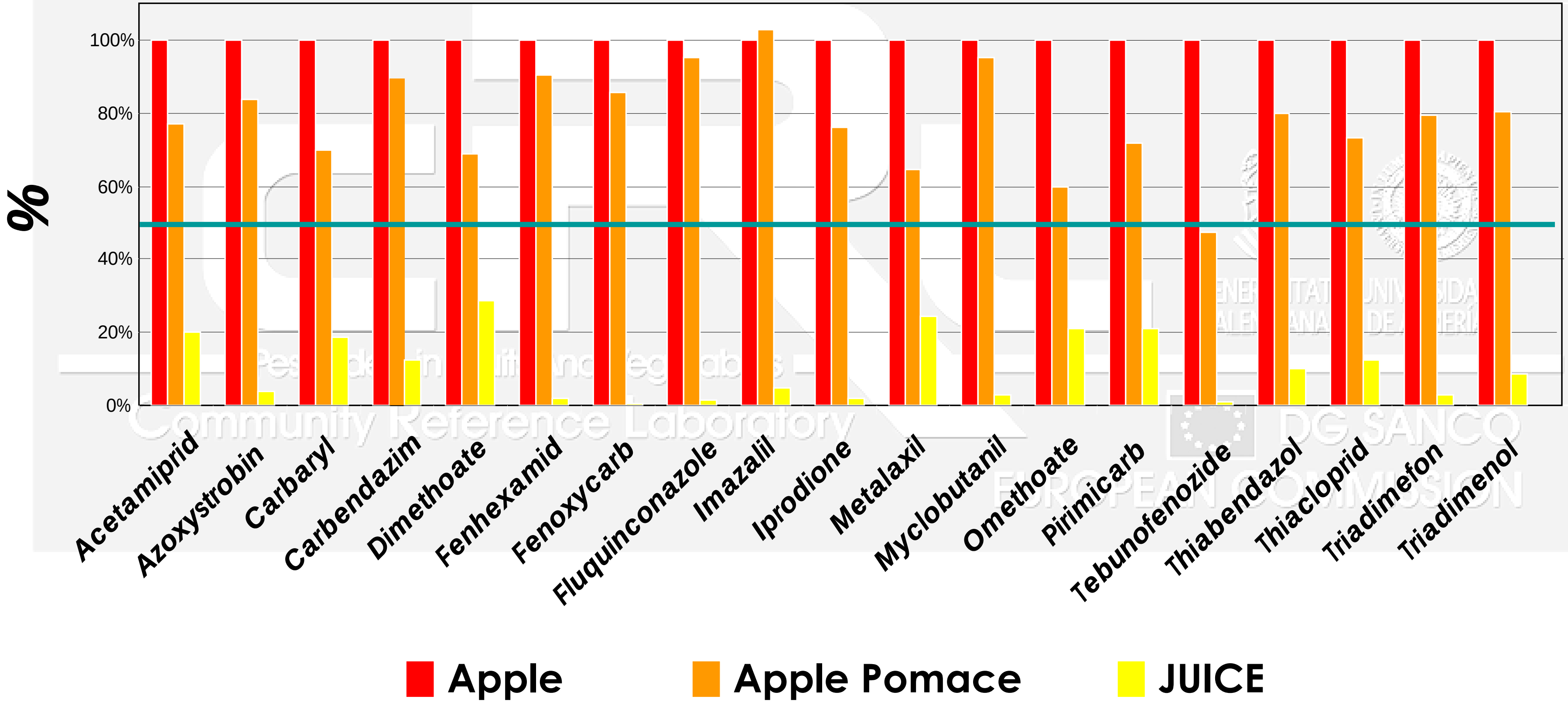
Yields obtained

$$\% \text{ of Juice(Oil/Wine)} = \frac{\text{Volume obtained (mL) x densty (g/mL)}}{\text{Initial Weight (g)}}$$

RAC	% Juice	%
Olive oil	15-20%	Pomace (65-70%)
Orange	35-63%	Peel(12%-25%) Pulp(30%-42%)
Apple	40-50%	Pomace (50%)
Wine	55-70%	Pomace (30%)

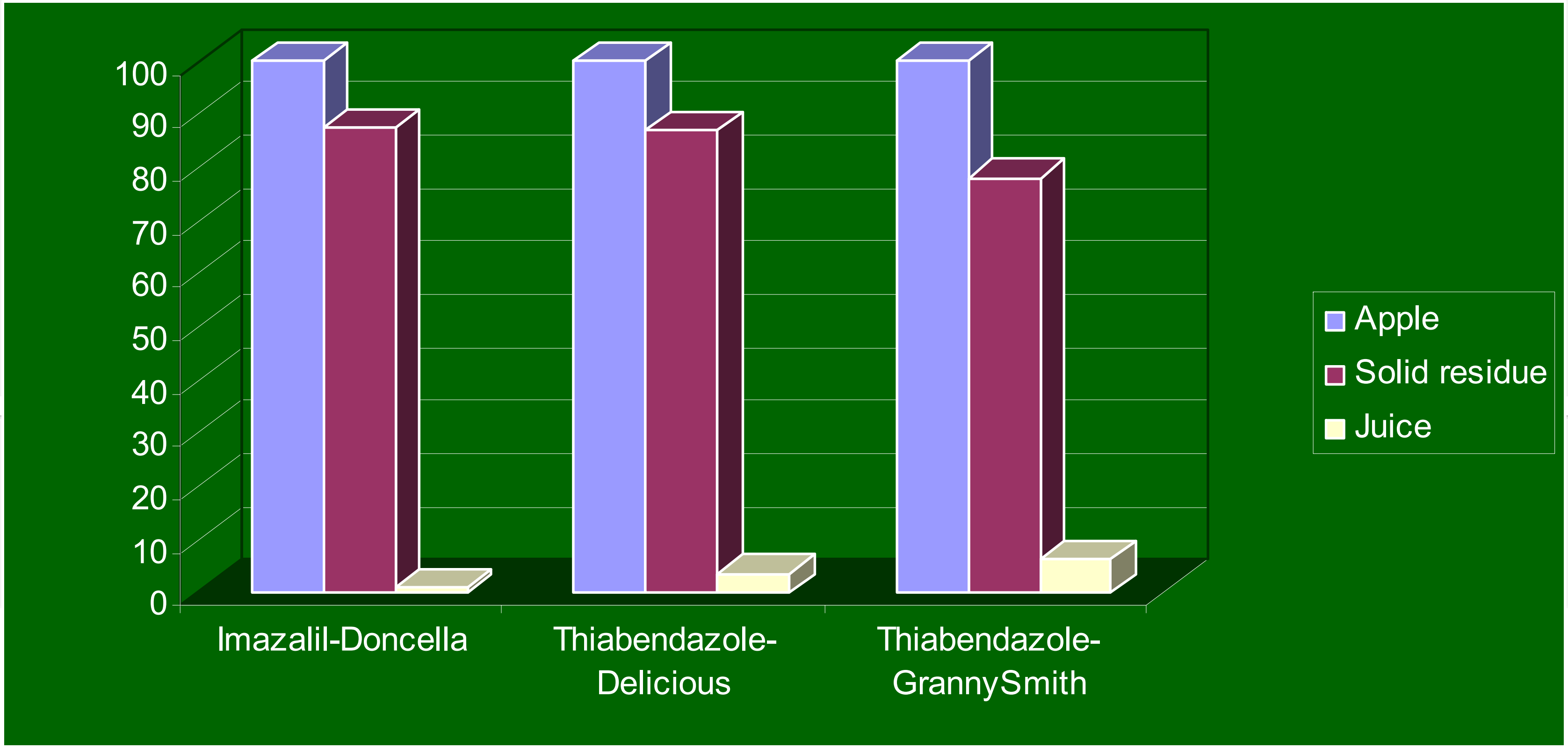
Results on Apples

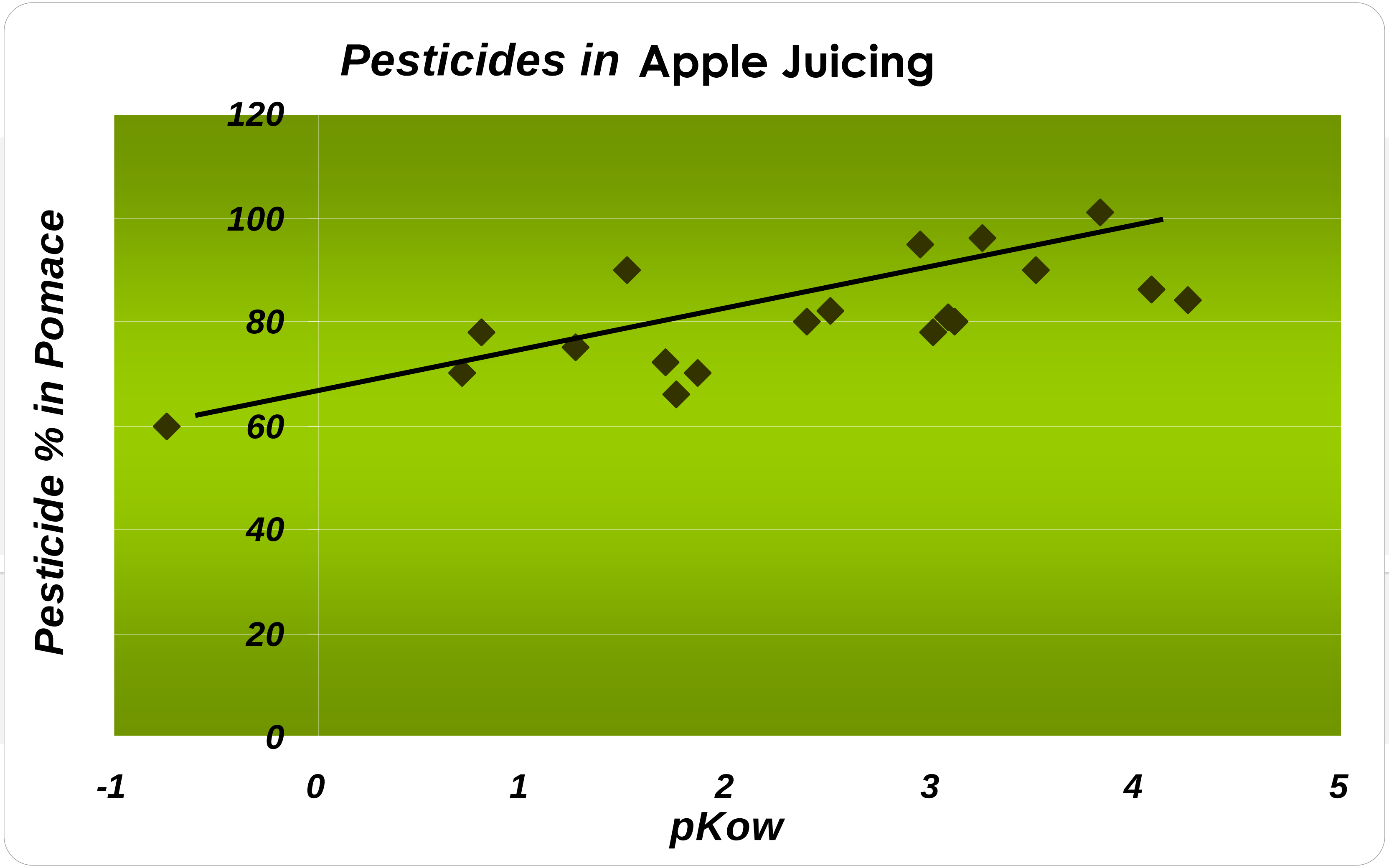
- Pesticide distribution %

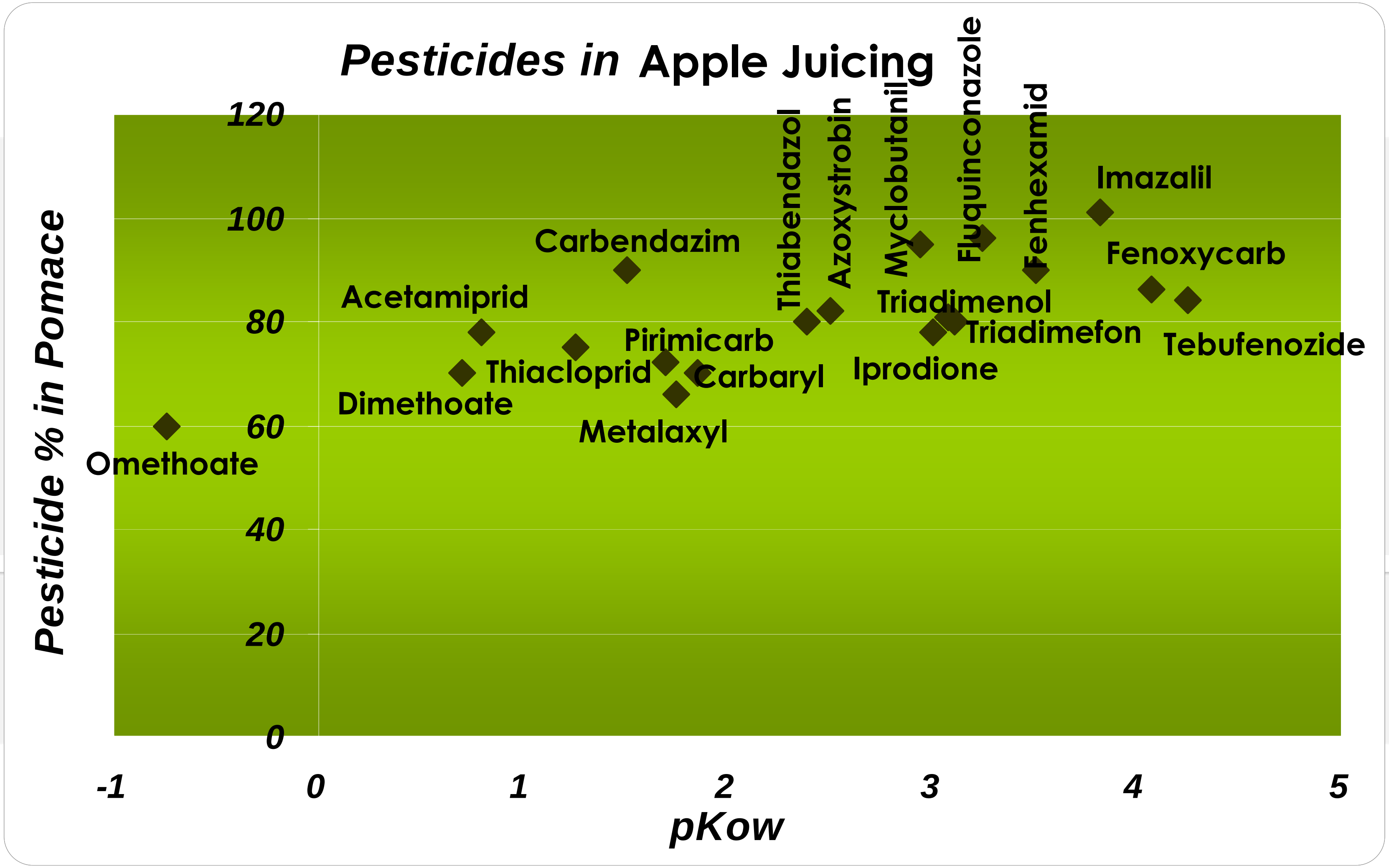


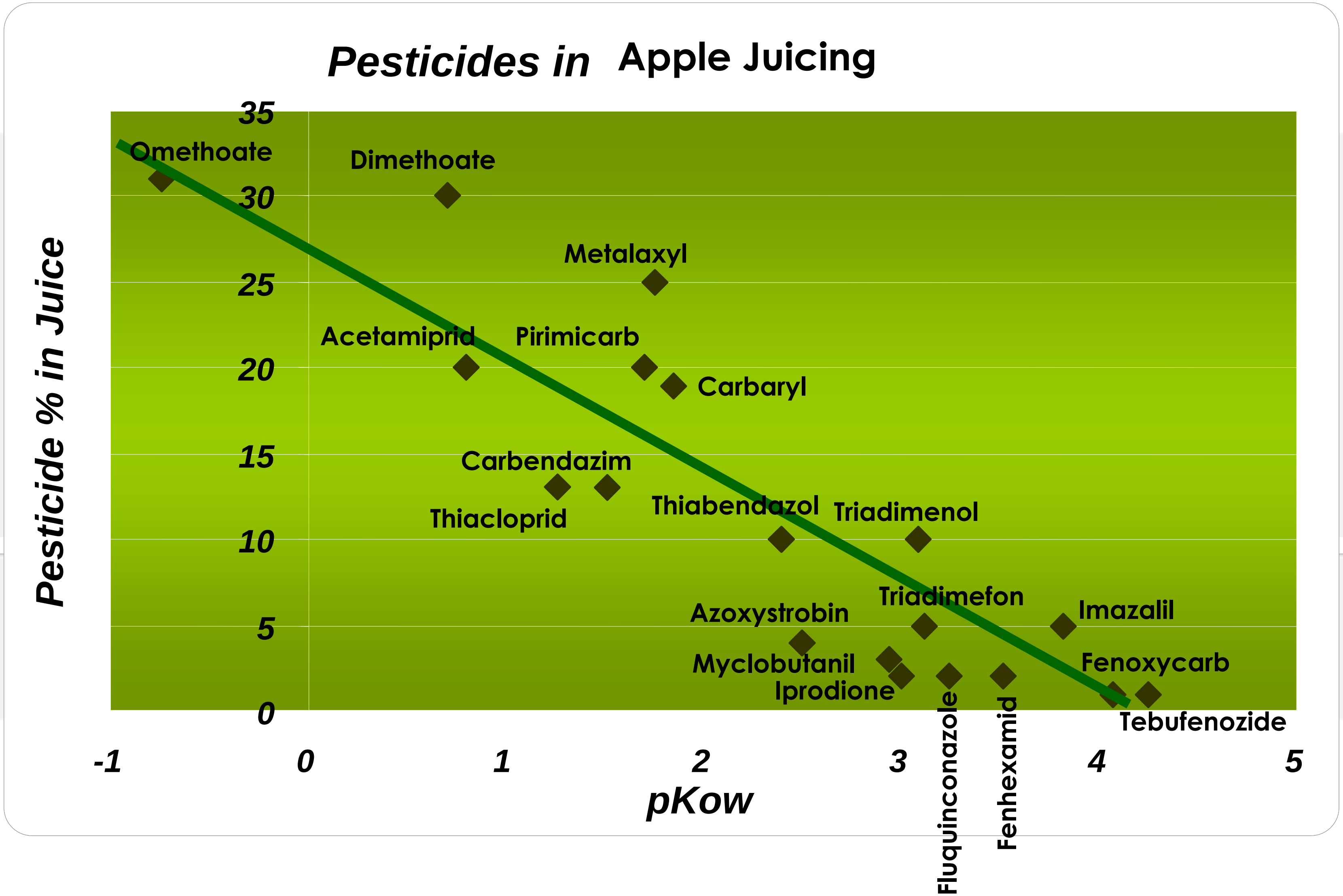
Results

- Real samples analisys

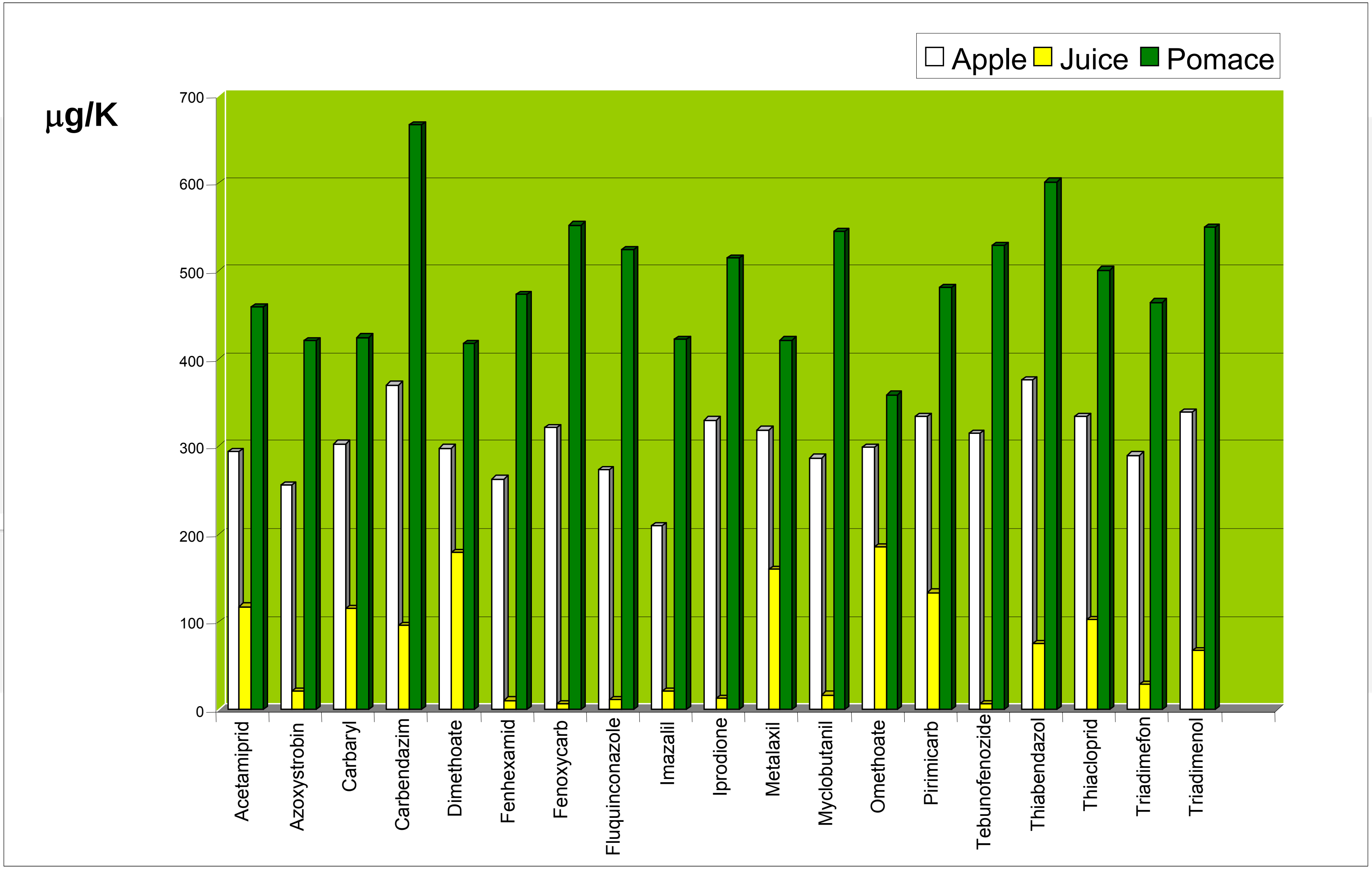



Pesticides in Apple Juicing
Pesticide % in Pomace
120
100
80
60
40
20
0
-1
0
1
2
3
4
5
pKow


Pesticides in Apple Juicing
Pesticide % in Pomace
pKow
120
100
80
60
40
20
0
-1
0
1
2
3
4
5
Omethoate
Acetamiprid
Dimethoate
Thiacloprid
Carbendazim
Pirimicarb
Metalaxyl
Carbaryl
Thiabendazol
Azoxystrobin
Myclobutanil
Fluquinconazole
Fenhexamid
Triadimenol
Triadimefon
Iprodione
Imazalil
Fenoxycarb
Tebufenozide


Pesticides in Apple Juicing
Pesticide % in Juice
pKow
35
30
25
20
15
10
5
0
-1
0
1
2
3
4
5
Omethoate
Dimethoate
Metalaxyl
Acetamiprid
Pirimicarb
Carbaryl
Carbendazim
Thiacloprid
Thiabendazol
Triadimenol
Triadimefon
Azoxystrobin
Imazalil
Myclobutanil
Iprodione
Fenoxycarb
Tebufenozide
Fluquinconazole
Fenhexamid

Results • Pesticide distribution-concentration

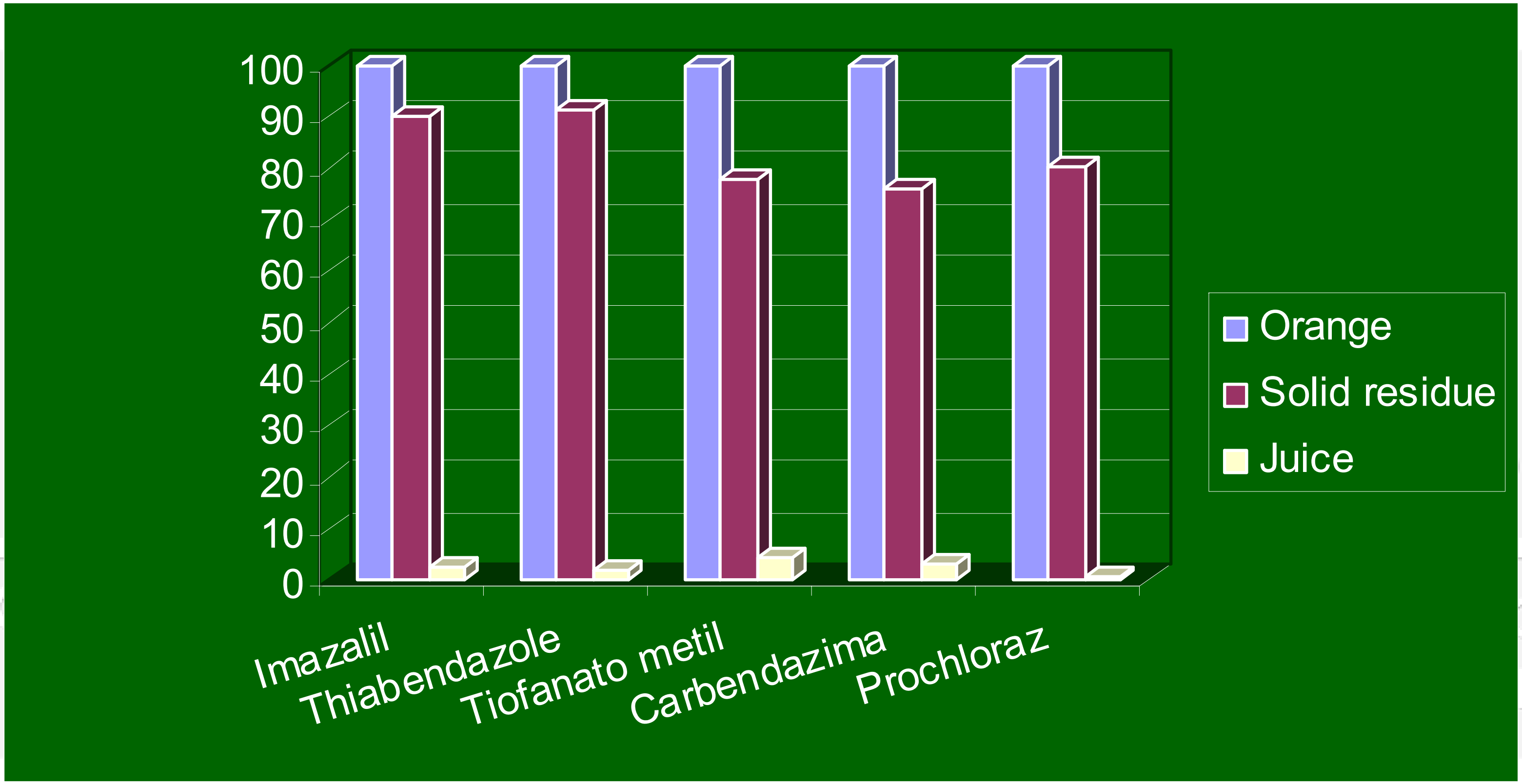


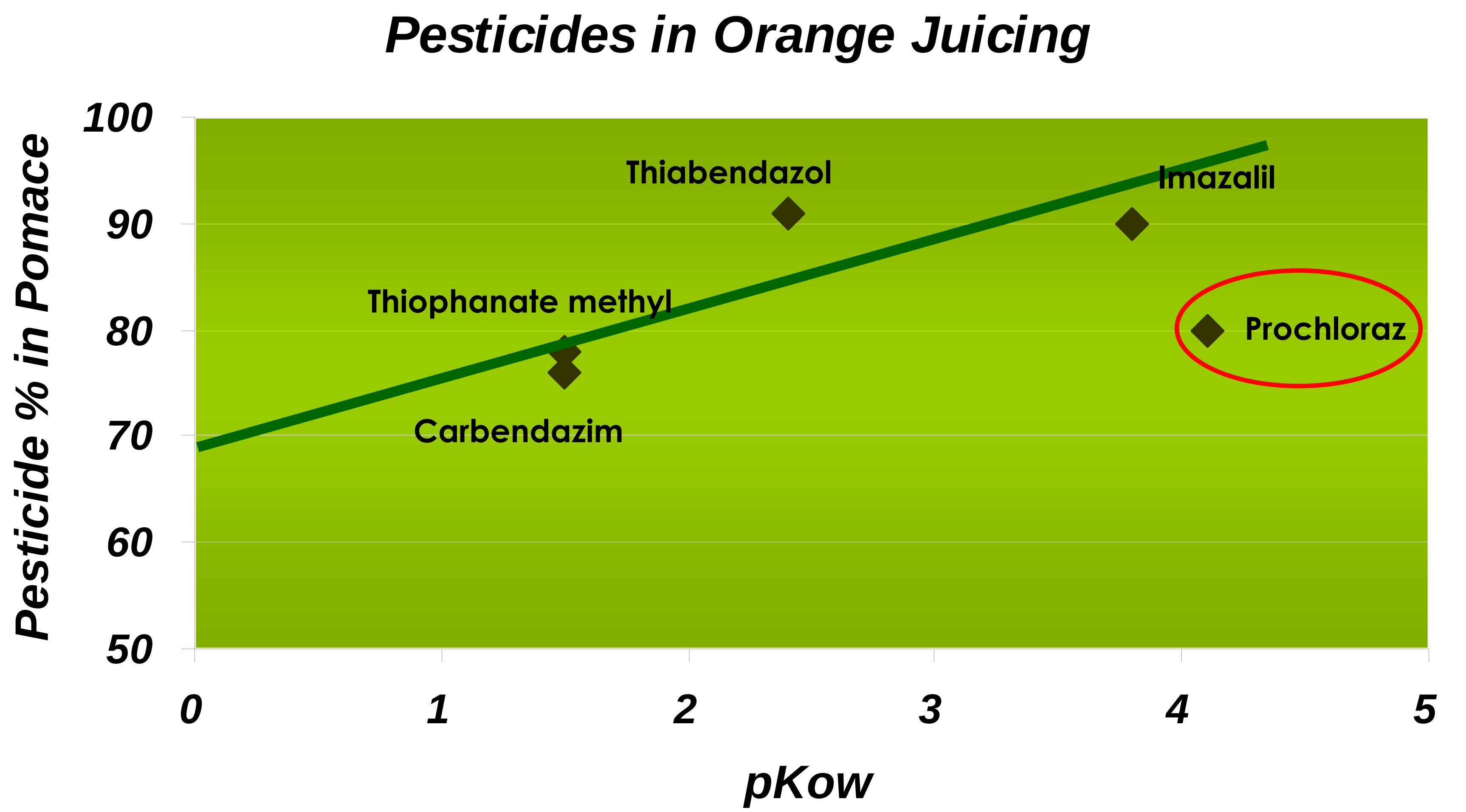
Pesticide	Log Kow	Water solubility	
Thiacloprid	1.26	184 mg/L	
Carbendazim	1.50	8 mg/L	
Pirimicarb	1.70	2700 mg/L	
Metalaxil	1.75	8400 mg/L	

Results on Oranges

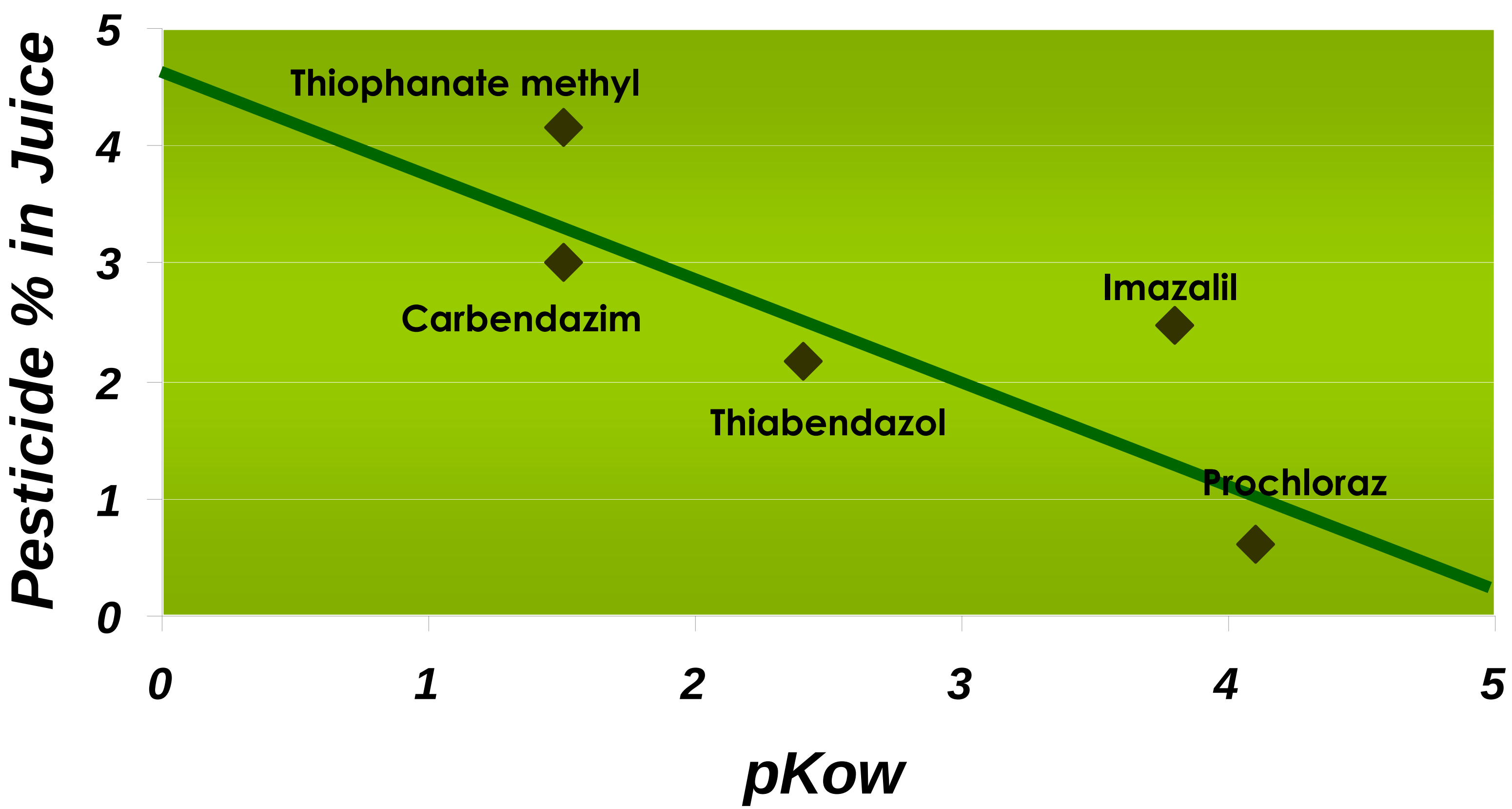
Juice

- **Pesticide distribution**

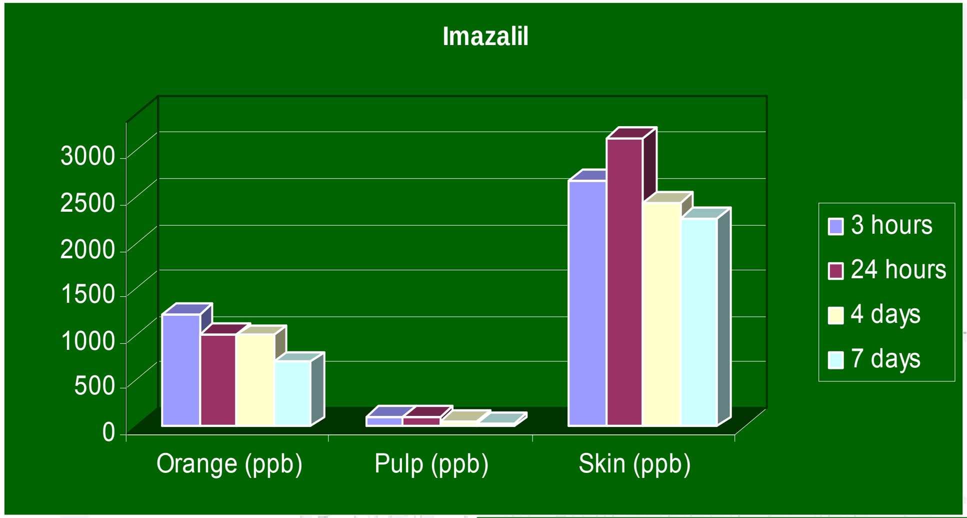


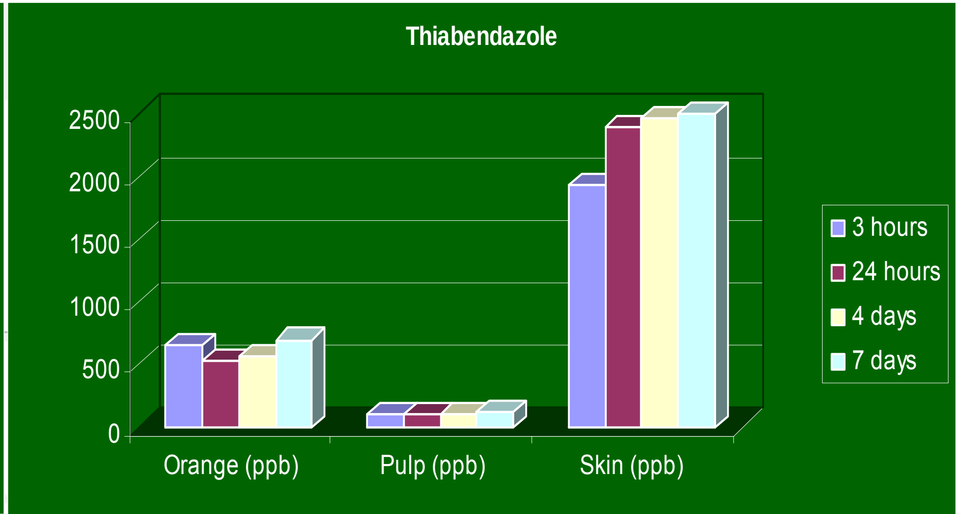

Pesticides in Orange Juicing
Pesticide % in Pomace
100
90
80
70
60
50
0
1
2
3
4
5
pKow
Thiabendazol
Imazalil
Thiophanate methyl
Prochloraz
Carbendazim

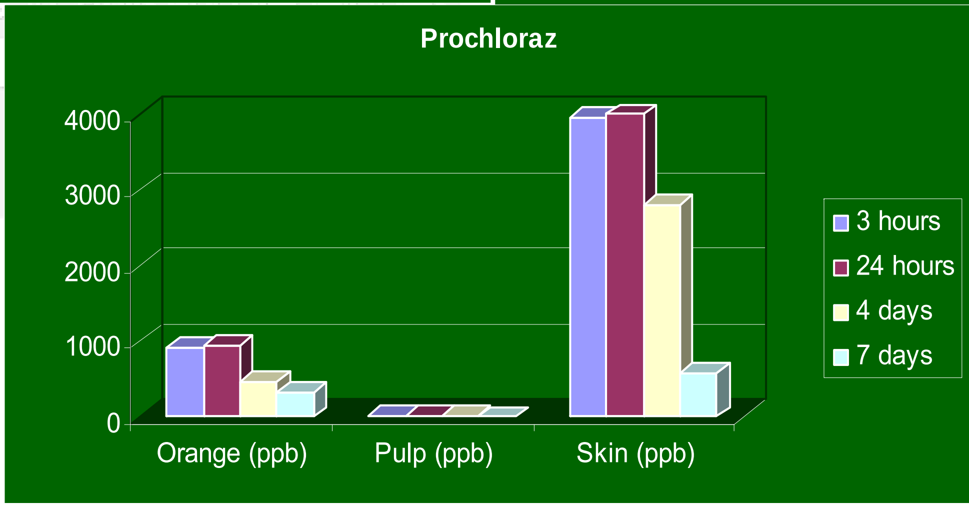
Pesticides in Orange Juicing



Orange - Concentration (µg/kg)

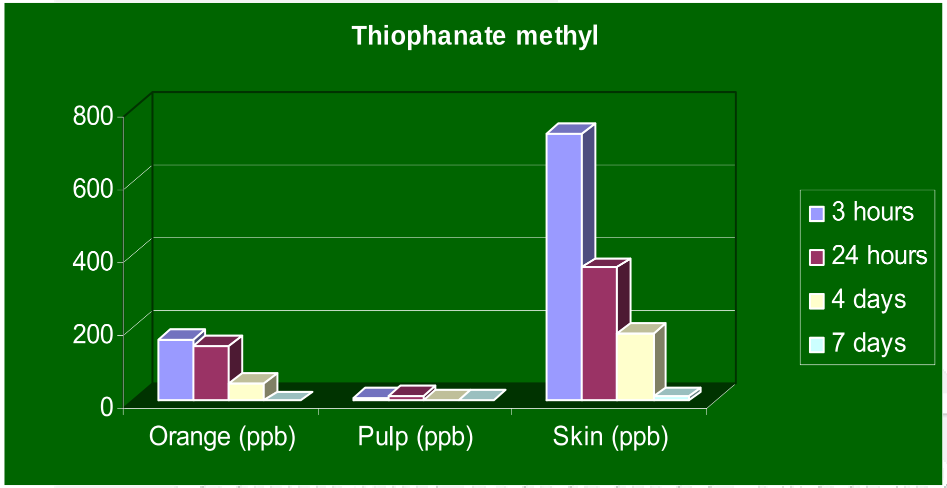


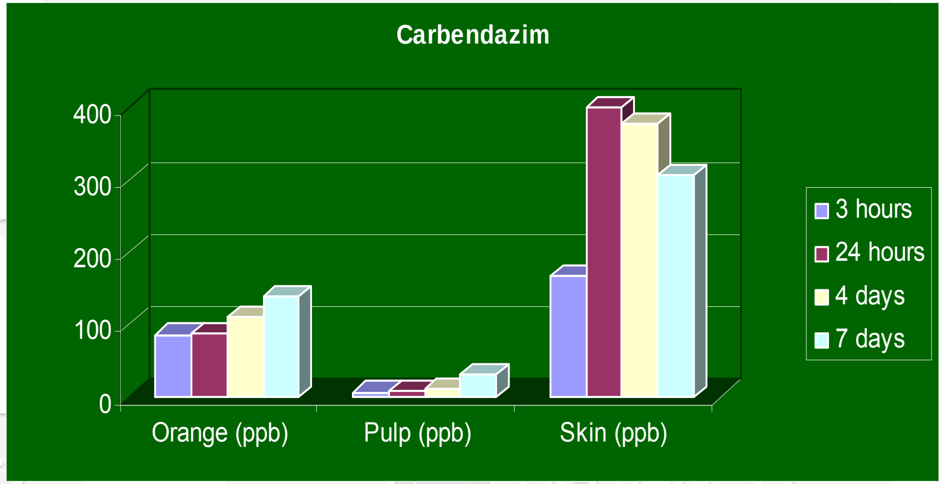




Results

Orange - Concentration (µg/kg)





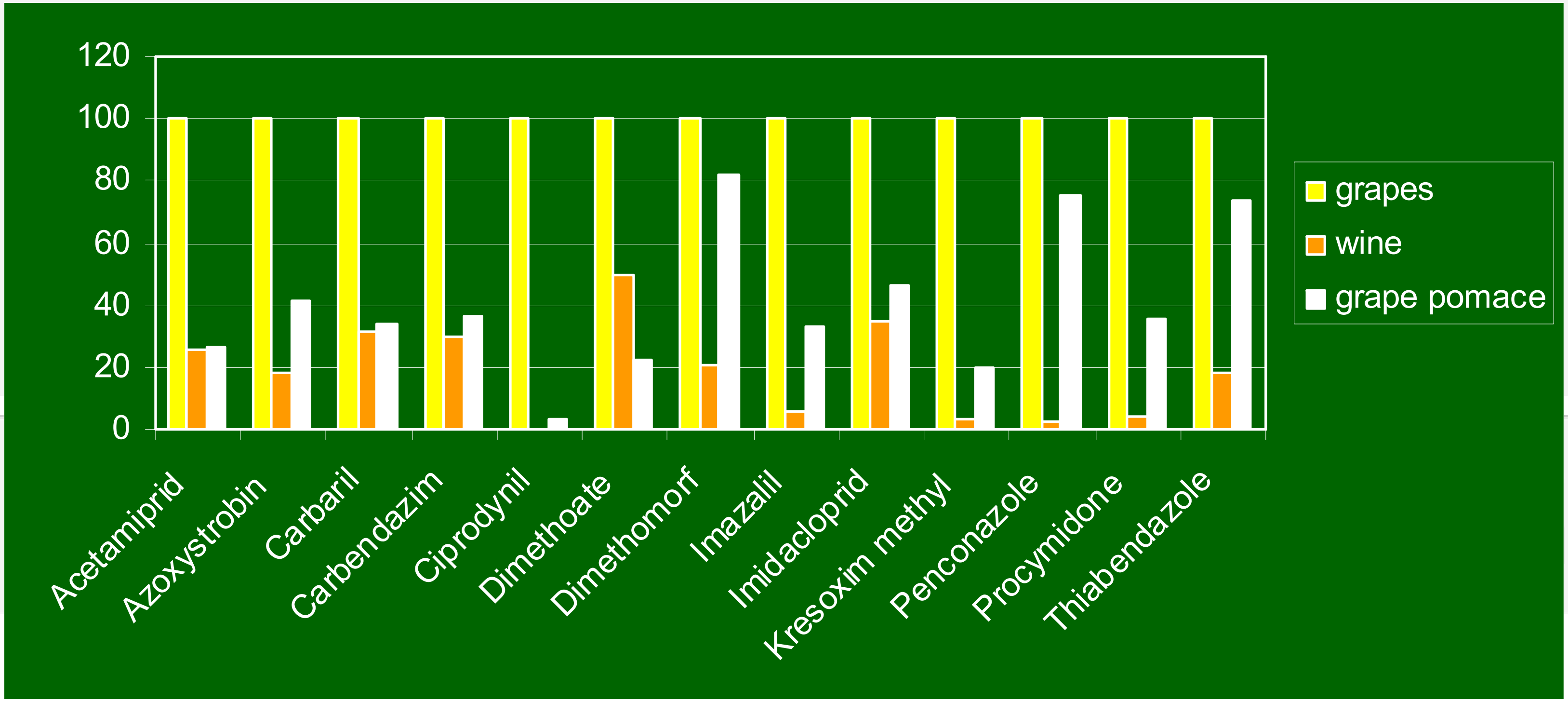
Results

- Real samples analisys

Pesticide	Orange (µg/kg)	Peel (µg/kg)	Pomace (µg/kg)
Carbendazim	9	18	-
Imazalil	955	3510	37

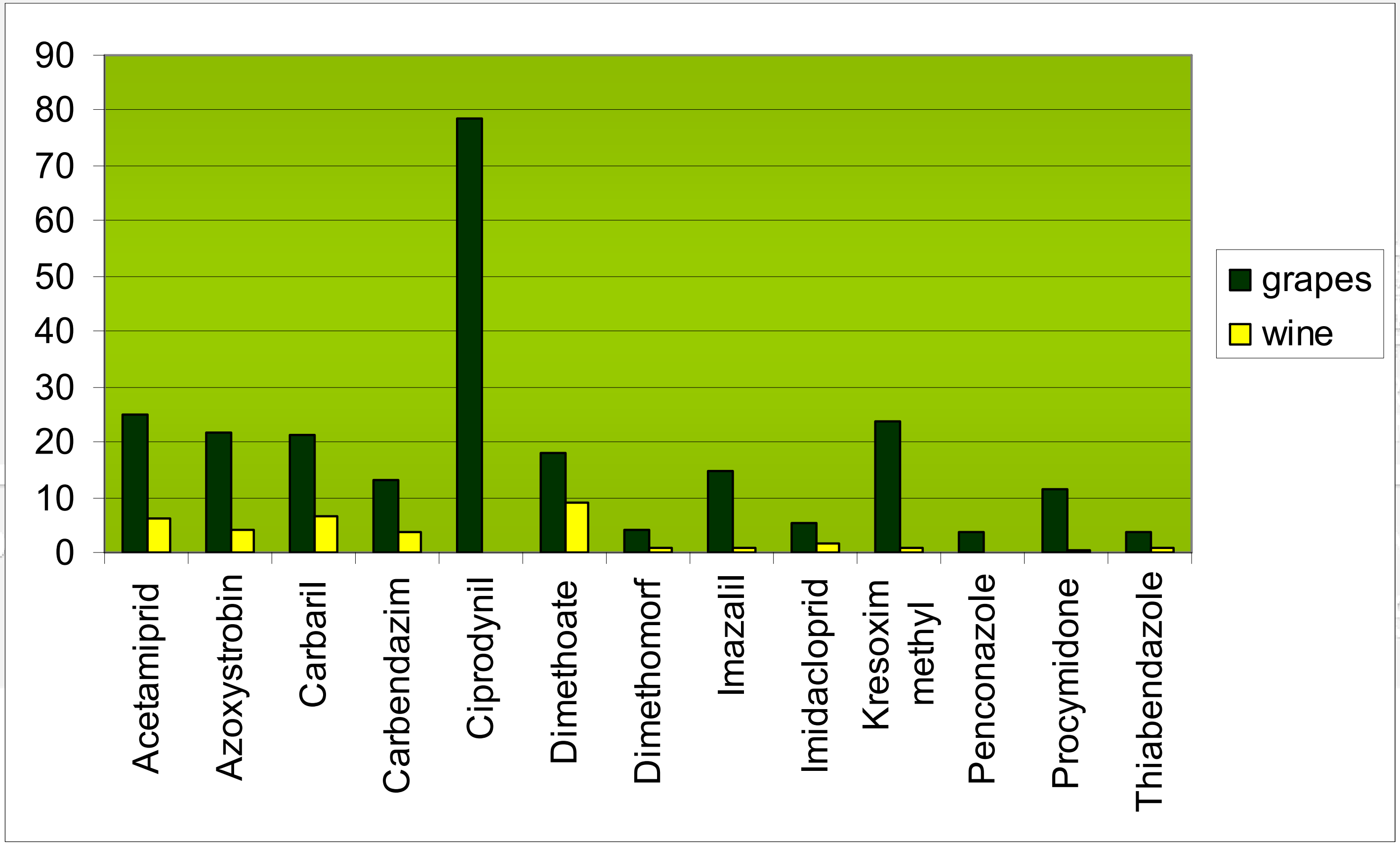
Results on Wine

- Distribution of pesticides (% mg)



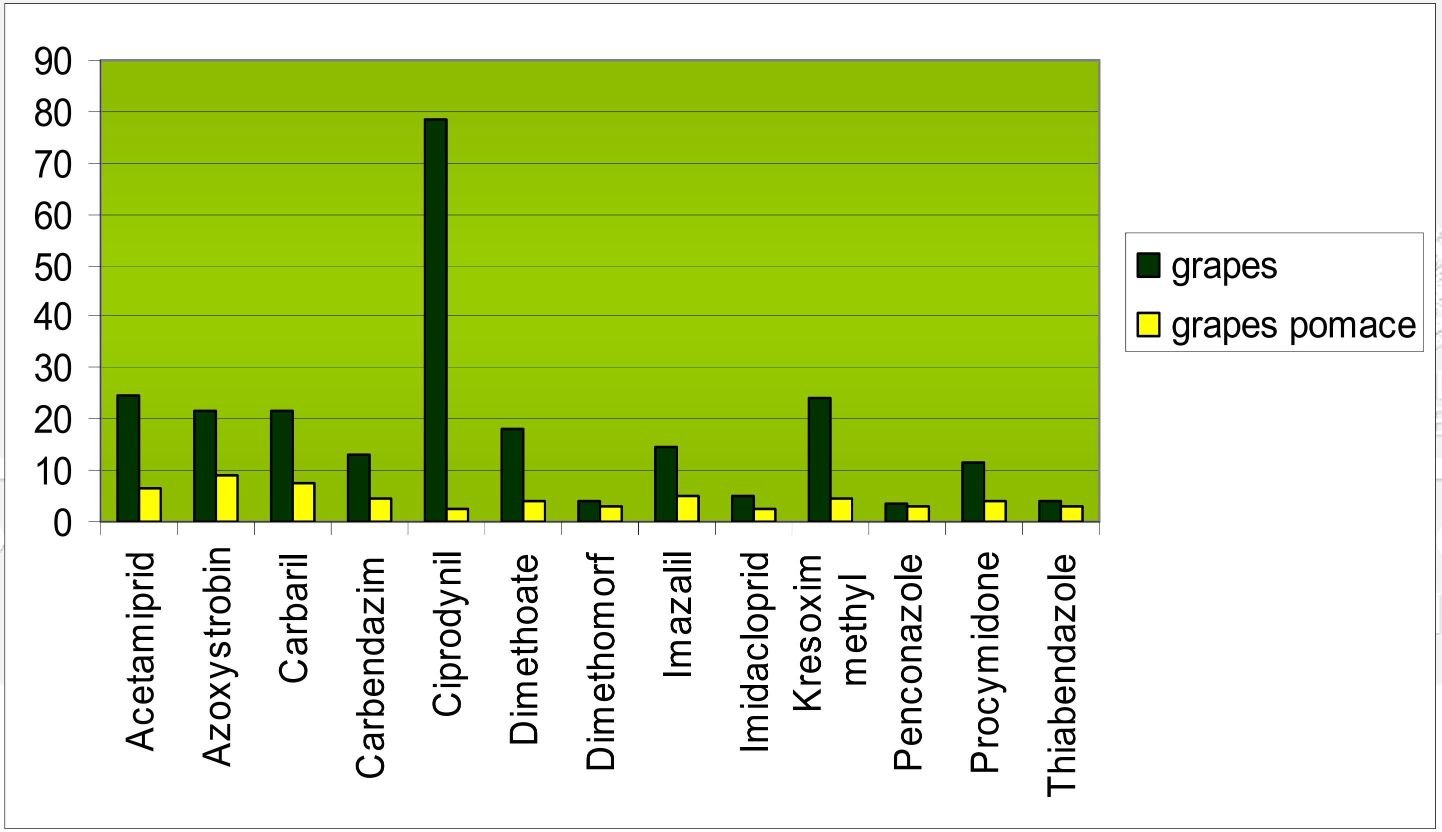
Results

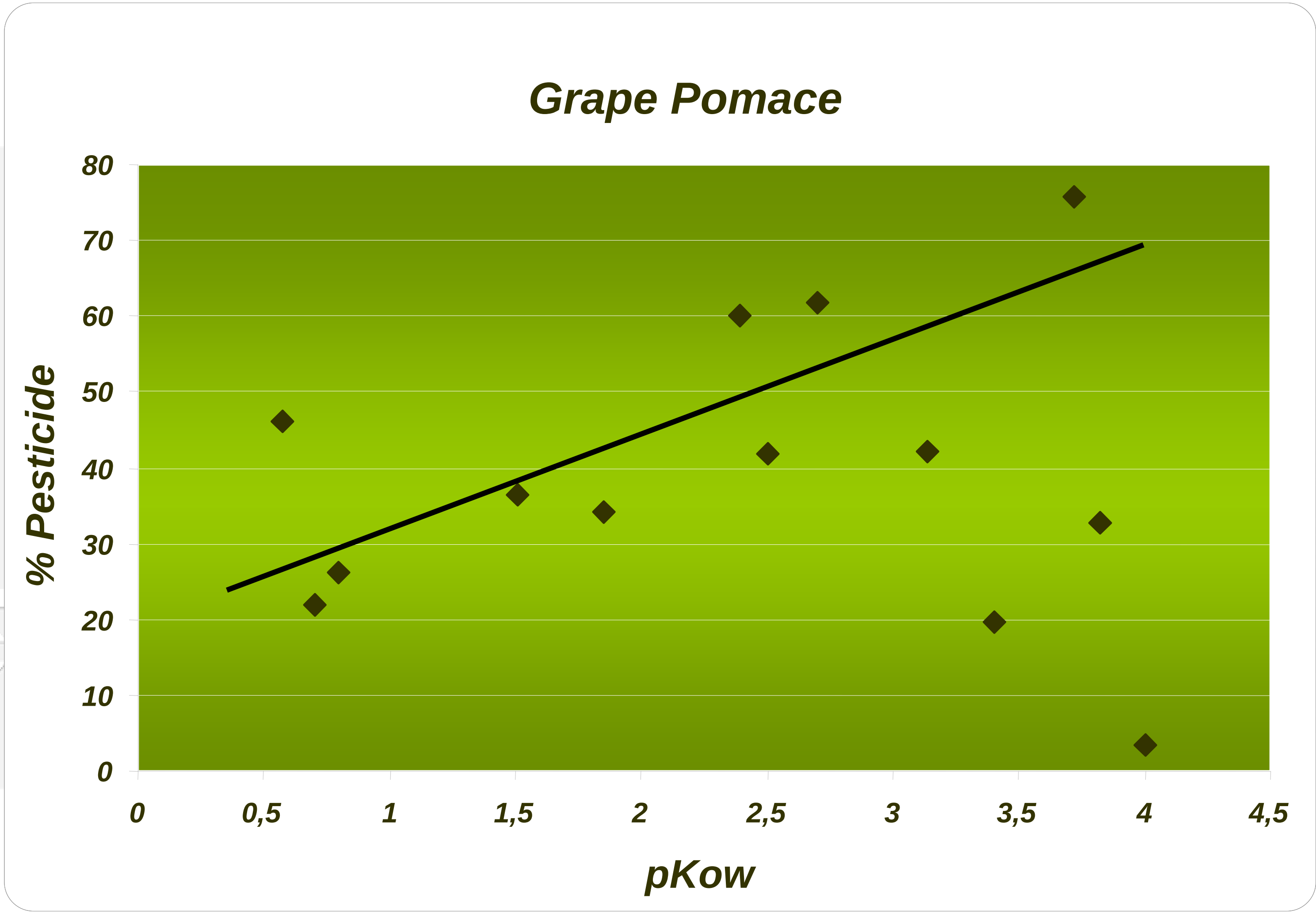
- Distribution of pesticides (mg)

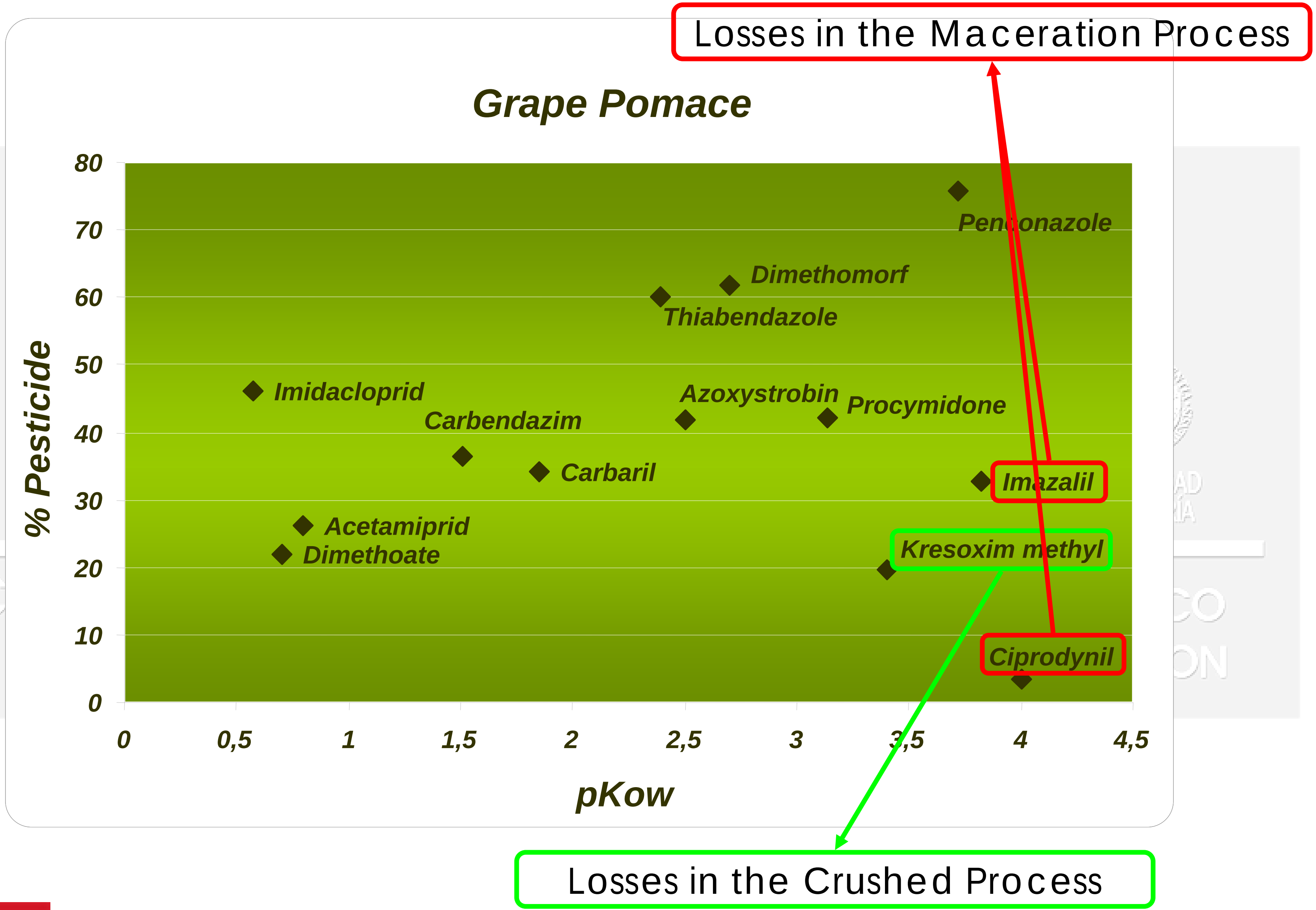


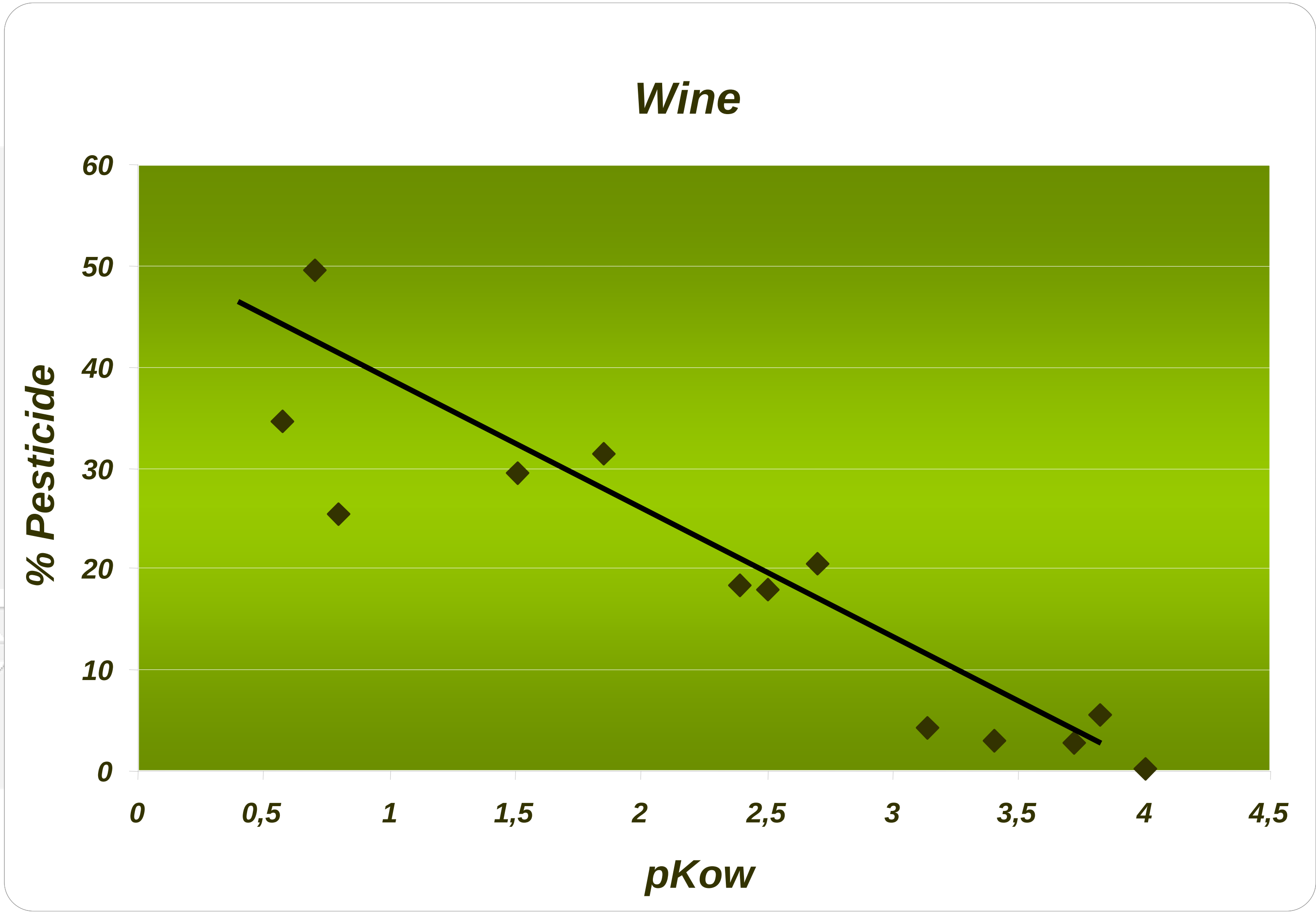
Results

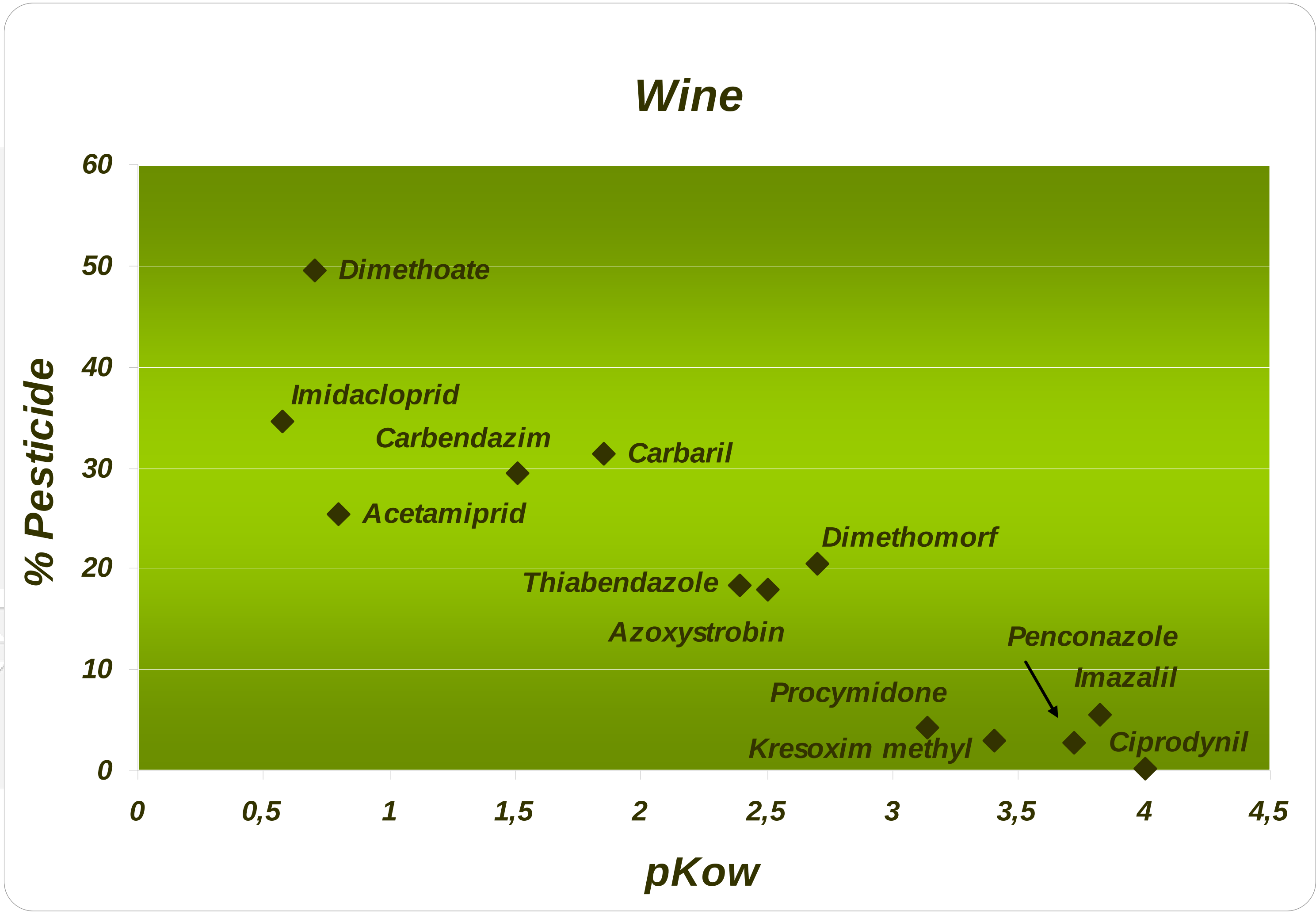
- Distribution of pesticides (mg)




Grape Pomace
% Pesticide
0
10
20
30
40
50
60
70
80
0
0,5
1
1,5
2
2,5
3
3,5
4
4,5
pKow

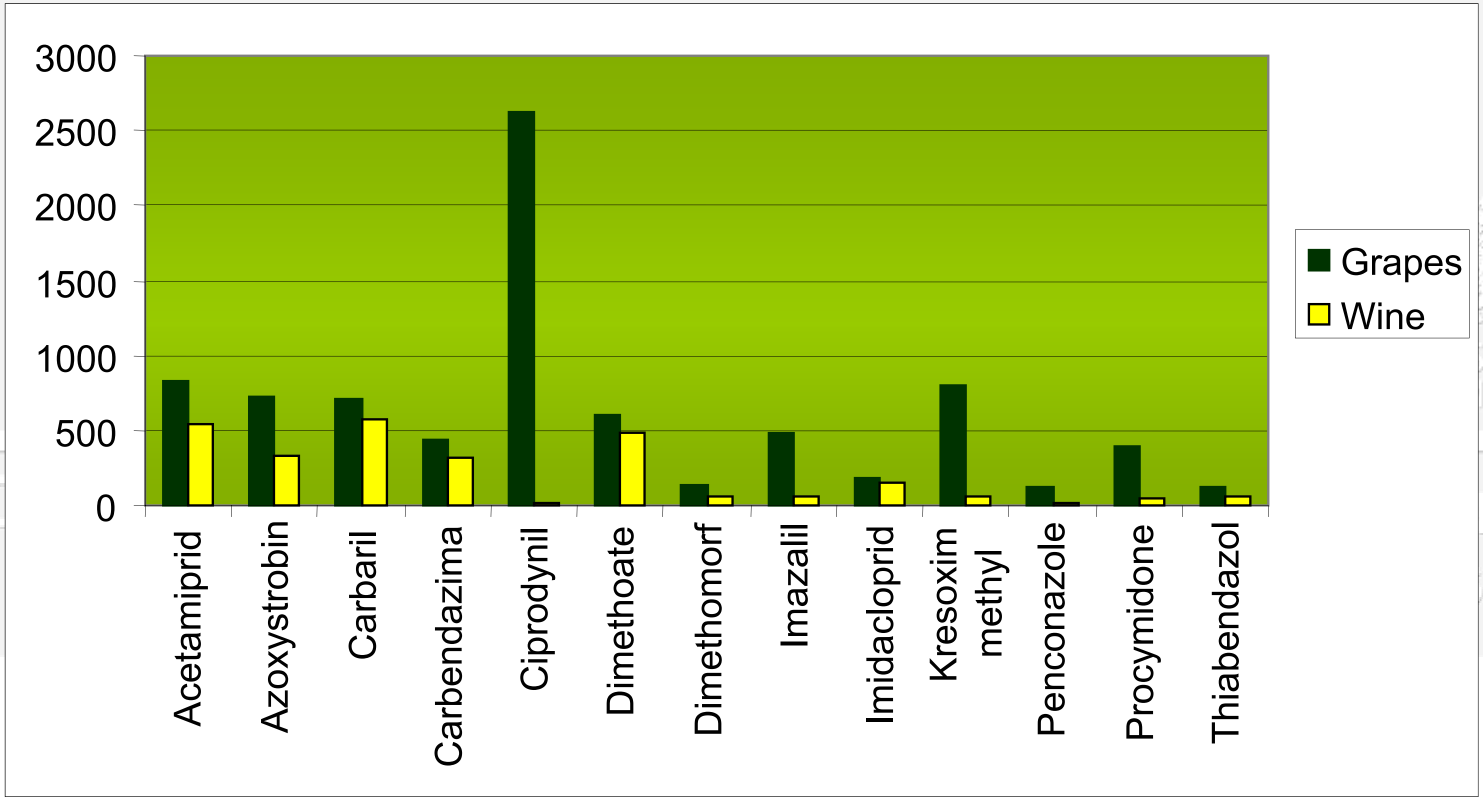

Losses in the Maceration Process
Grape Pomace
% Pesticide
pKow
Penconazole
Dimethomorf
Thiabendazole
Imidacloprid
Carbendazim
Azoxystrobin
Procymidone
Carbaril
Imazalil
Acetamiprid
Dimethoate
Kresoxim methyl
Ciprodynil
80
70
60
50
40
30
20
10
0
0
0,5
1
1,5
2
2,5
3
3,5
4
4,5
Losses in the Crushed Process


Wine
60
50
40
30
20
10
0
% Pesticide
0
0,5
1
1,5
2
2,5
3
3,5
4
4,5
pKow


Wine
60
50
40
30
20
10
0
% Pesticide
0
0,5
1
1,5
2
2,5
3
3,5
4
4,5
pKow
Dimethoate
Imidacloprid
Carbendazim
Carbaril
Acetamiprid
Dimethomorf
Thiabendazole
Azoxystrobin
Penconazole
Imazalil
Procymidone
Kresoxim methyl
Ciprodynil

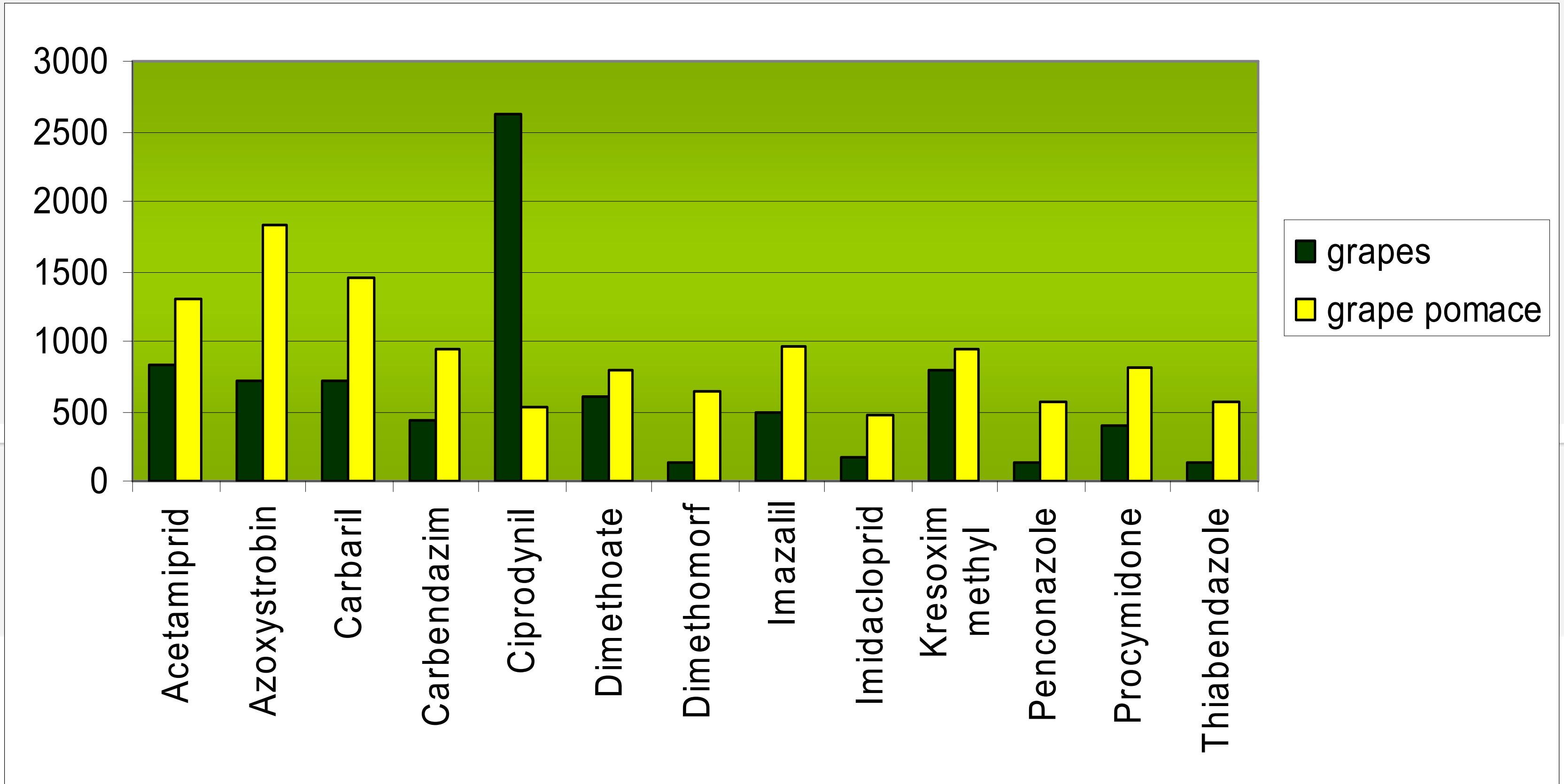
Results

- Distribution of pesticides (µg/Kg)

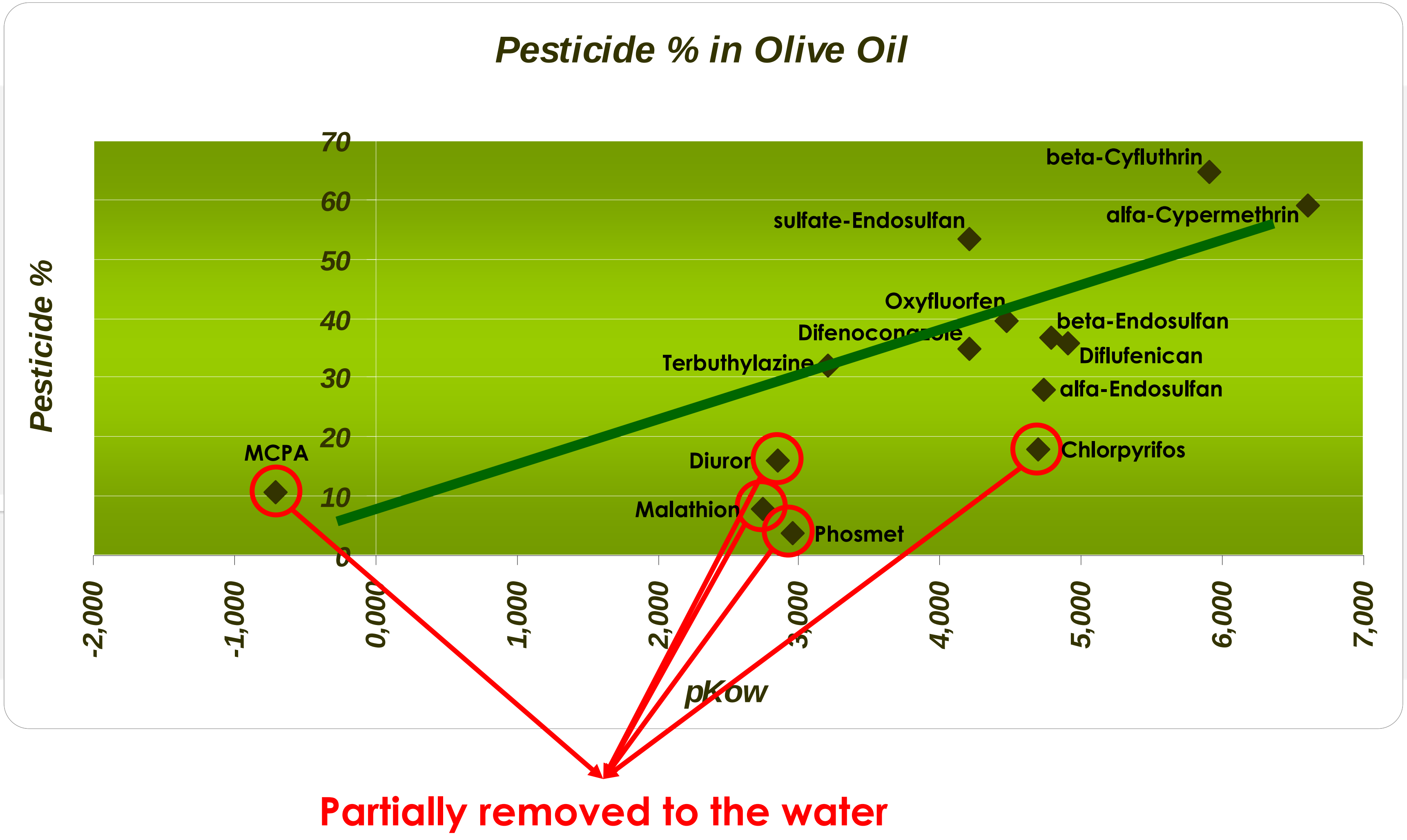


Results

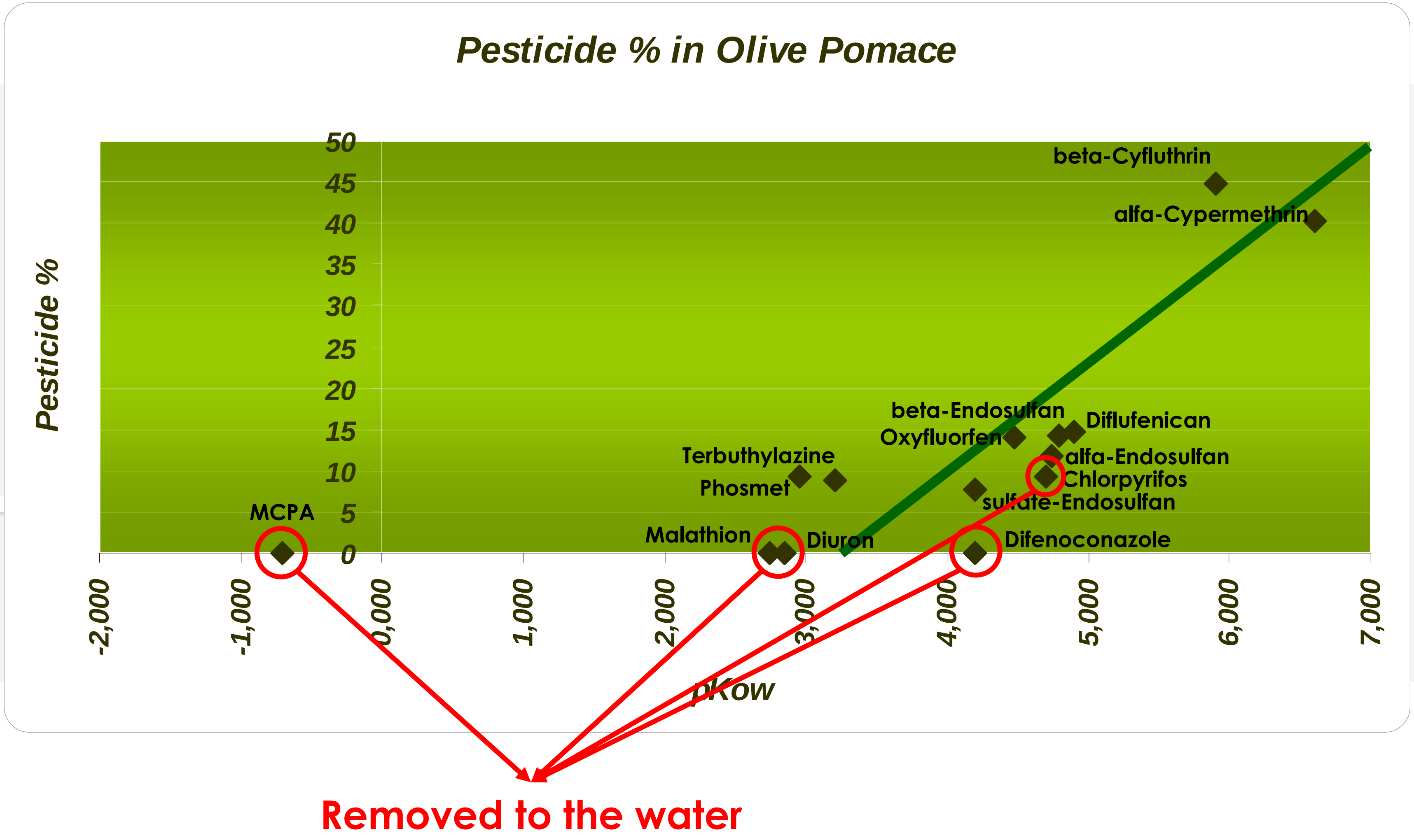
- **Distribution of pesticides (µg/Kg)**

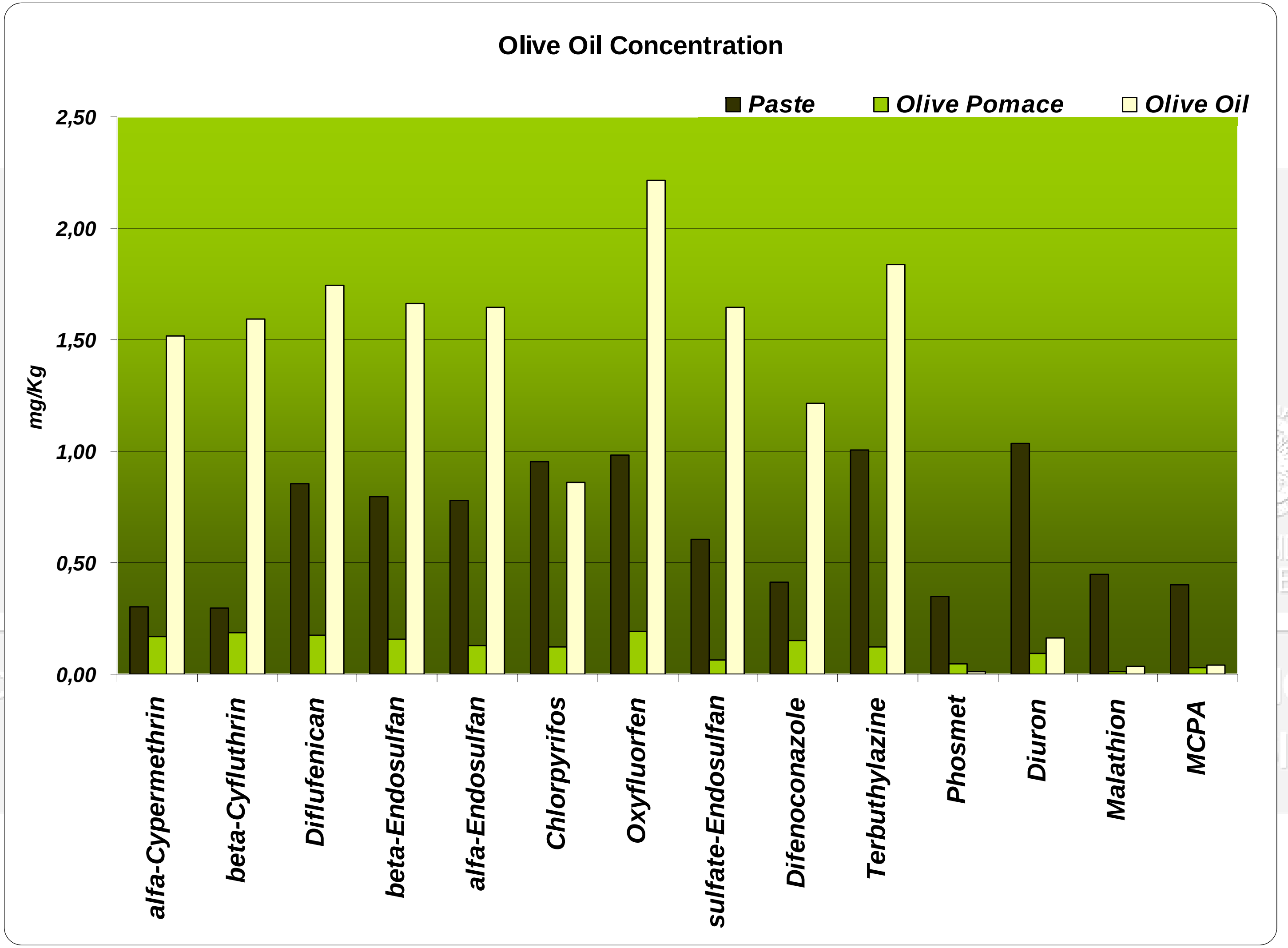


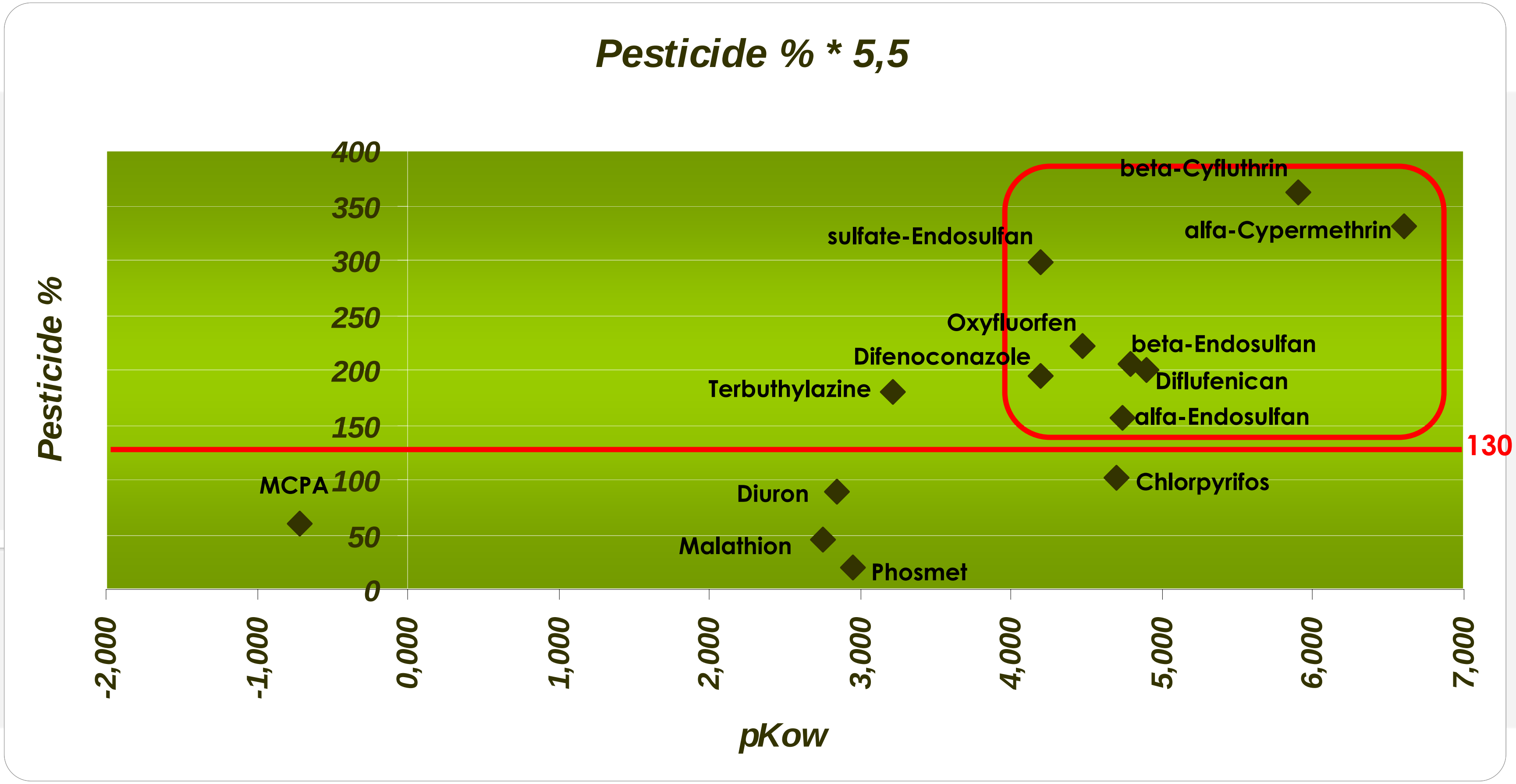
Results on Olive Oil



Pesticide	Solubility
alfa-Cypermethrin	0.004
beta-Cyfluthrin	0.0012
Diflufenicam	0.05
beta-Endosulfan	0.33
alfa-Endosulfan	0.32
Chlorpyrifos	1.4
Oxyfluorfen	0.116
sulfo-Endosulfan	>0.33
Difenoconazole	15
Terbuthylazine	8.5
Phosmet	25
Diuron	36.4
Malation	145
MCPA	273.9


Pesticide % in Olive Pomace
Pesticide %
50
45
40
35
30
25
20
15
10
5
0
-2,000
-1,000
0,000
1,000
2,000
3,000
4,000
5,000
6,000
7,000
pKow
beta-Cyfluthrin
alfa-Cypermethrin
beta-Endosulfan
Diflufenican
Oxyfluorfen
alfa-Endosulfan
Chlorpyrifos
sulfate-Endosulfan
Terbuthylazine
Phosmet
MCPA
Malathion
Diuron
Difenoconazole
Removed to the water

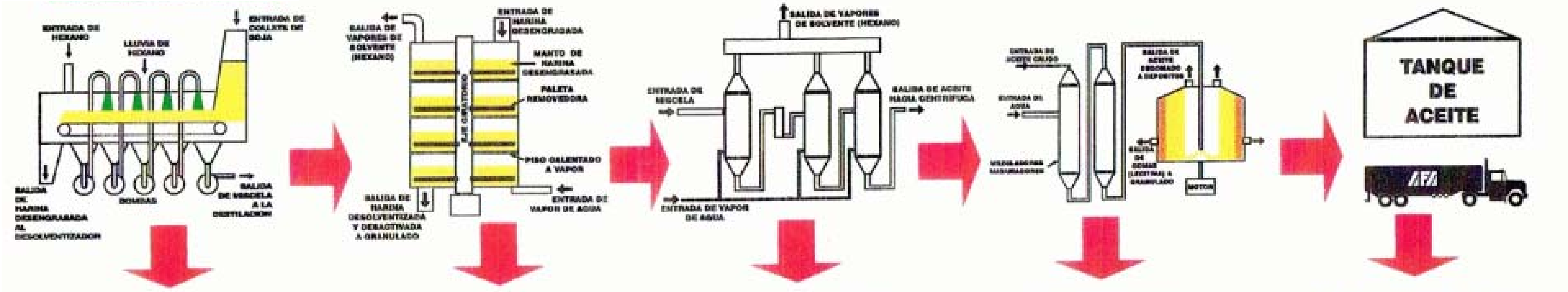

Olive Oil Concentration
Paste
Olive Pomace
Olive Oil
mg/Kg
2,50
2,00
1,50
1,00
0,50
0,00
alfa-Cypermethrin
beta-Cyfluthrin
Diflufenican
beta-Endosulfan
alfa-Endosulfan
Chlorpyrifos
Oxyfluorfen
sulfate-Endosulfan
Difenoconazole
Terbuthylazine
Phosmet
Diuron
Malathion
MCPA


Pesticide % * 5,5
Pesticide %
pKow
400
350
300
250
200
150
100
50
0
-2,000
-1,000
0,000
1,000
2,000
3,000
4,000
5,000
6,000
7,000
130
beta-Cyfluthrin
alfa-Cypermethrin
sulfate-Endosulfan
Oxyfluorfen
beta-Endosulfan
Difenoconazole
Diflufenican
Terbuthylazine
alfa-Endosulfan
MCPA
Diuron
Chlorpyrifos
Malathion
Phosmet

Soya

Pesticides in Soya			
Insecticides		**Fungicides**	
Alfametrina	Metiocarb	Captan	Flusilazol
Cartap	Metomil	Carbendazim	Kresoxim metil
Cipermetrina	Metxiofenocide	Metalaxil	Myclobutanil
Cialotrina	Novaluron	Carboxin	Pyraclostrobin
Clorpirifos	Pirimifos metil	Difeconazol	Tebuconazol
Clorpirifosmetil	Propenofos	Flutriafol	
Deltametrina	Spinosad	Fludioxinil	
Diazinon	Teflubenzuron	Tiodicarb	
Diflubenzuron	Thiametoxam	Iprodione	
Endosulfan	Tiodicarb	Azoxystrbin	
Fipronil	Imidacloprid	Ciproconazol	
Flufenuxuron	Tefubonizide	Epoxiconazol	
Lufenuron	Triflumuron	Tetraconazol	
Malathion	Zetametrina	Propiconazol	

PROCESO DE EXTRACCION DE ACEITE DE SOJA, DEGOMADO DEL ACEITE



EXTRACCION DEL ACEITE

EL MATERIAL PREPARADO INGRESA AL EXTRACTOR CON LAS SIGUIENTES CARACTERISTICAS: HUMEDAD 10%, MATERIA GRASA 20%, TEMPERATURA INFERIOR A LOS 60 °C. EN LA EXTRACCION SE REALIZA UN LAVADO DEL MATERIAL PREPARADO COMO YA VIMOS, CON UN SOLVENTE QUE DILUYE EL ACEITE ARRASTRANDOLO Y DEJANDO LA HARINA DESENGRASADA. LOS COLLETS PROVENIENTES DE LA EXTRACCION SON DISPUESTOS EN UN MANTO DE 2 METROS DE ESPESOR A UNA LLUVIA DE SOLVENTE QUE SE RECIRCULA MEDIANTE BOMBAS. EL EXTRACTOR SALEN ENTONCES MATERIALES EN DOS FORMAS: 1/ SOLIDA, QUE ES LA HARINA DESENGRASADA PERO HUMEDA Y MOJADA EN SOLVENTE; 2/ LIQUIDA, QUE ES UNA MEZCLA DE ACEITE Y SOLVENTE QUE ES LLAMADA MISCELA.

*LA HARINA TIENE MEZCLADO UN 25% DE SOLVENTE Y UN RESTO DE ACEITE MENOR AL 1%. LA MISCELA TIENE UNA PROPORCION DE 25% DE ACEITE Y UN 75% DE SOLVENTE.

DESOLVENTIZADO Y TOSTADO DE LA HARINA

EN ESTE PROCESO SE EFECTUAN BASICAMENTE DOS OPERACIONES: 1/ LA PRIMERA ES DESOLVENTIZAR O SECAR EL SOLVENTE DE LA HARINA; 2/ LA SEGUNDA ES EL TOSTADO QUE ES UNA COCCION HUMEDA QUE ELIMINA LA ENZIMA UREASA PERMITIENDO ASI QUE ESTA HARINA SEA DIGESTIBLE POR LOS ANIMALES A QUIEN SERA DADA EN ALIMENTO.

ESTAS OPERACIONES SE REALIZAN EN UN EQUIPO LLAMADO "DT" QUE ES EL PRINCIPAL CONSUMIDOR DE ENERGIA DE LA PLANTA DE EXTRACCION. LA HARINA SALE CON UNA TEMPERATURA DE 100 °C Y UNA HUMEDAD DE 17-18% DEBIDO A LA UTILIZACION DEL VAPOR. EL SOLVENTE AQUI ELIMINADO EN FORMA DE VAPOR SE RECICLA Y UTILIZA NUEVAMENTE EN LA PLANTA PARA OTRO CICLO DE EXTRACCION.

DESTILACION DE LA MISCELA (RESCATE DEL ACEITE)

COMO YA HEMOS EXPLICADO ANTES EL ACEITE SE SEPARA DE LA SEMILLA PREPARADA USANDO UN SOLVENTE QUE QUEDA MEZCLADO CON ESTE FORMANDO UNA MEZCLA LLAMADA MISCELA. MEDIANTE EL PROCESO DE DESTILACION SE SEPARA EL ACEITE DEL SOLVENTE. EN ESTE PROCESO SE CALIENTA LA MISCELA A TEMPERATURAS SUPERIORES AL PUNTO DE EVAPORACION DEL SOLVENTE EN PRESENCIA DE VACIO, ENTONCES EL SOLVENTE SE EVAPORA DEJANDO AL ACEITE LIBRE DE ESTE. EL SOLVENTE EN ESTADO DE VAPOR SE ENFRIA LUEGO VOLVIENDOLO AL ESTADO LIQUIDO, FORMANDOSE ENTONCES UN CIRCUITO CERRADO EN EL QUE EL SOLVENTE ES USADO NUEVAMENTE PARA OTRO CICLO DE EXTRACCION.

CENTRIFUGADO DEL ACEITE

EL ACEITE OBTENIDO DEL PROCESO DE EXTRACCION-DESTILACION INCORPORA EN SU MASA ALGUNOS ELEMENTOS QUE SON INDESEABLES Y QUE DIFICULTAN SU ALMACENAJE Y POSTERIOR UTILIZACION.
ESTOS ELEMENTOS SON ALGUNOS DERIVADOS DEL FOSFORO LLAMADOS FOSFATIZADOS QUE TIENEN LA PARTICULARIDAD DE COMBINARSE CON AGUA FORMANDO COMPUESTOS DE GRUESA VISCOSIDAD. ESTA PROPIEDAD SE USA PARA EFECTUAR SU SEPARACION: COMO PRIMERA ETAPA SE AGREGA AL ACEITE UN 3% DE AGUA, LUEGO ESTA MEZCLA SE HACE PASAR POR UNA CLARIFICADORA CENTRIFUGA QUE SEPARA LOS COMPUESTOS DE ALTA DENSIDAD DEL ACEITE DEJANDO A ESTE PERFECTAMENTE CLARO. LOS COMPUESTOS AQUI SEPARADOS PUEDEN SER UTILIZADOS PARA LA PRODUCCION DE LECITINA Y OTROS COMPUESTOS, O AGREGADOS YA SECOS A LA HARINA GRANULADA.

COMPOSICION DEL ACEITE DE SOJA

ACEITE VEGETAL: PRODUCTO CONSTITUIDO POR ESTERES GLICERIDOS DE ACIDOS GRASOS Y SUS FOSFATIDOS ASOCIADOS, ESTEROLES, ALCOHOLES, HIDROCARBUROS Y PIGMENTOS.

COMPOSICION DEL ACEITE	COMPOSICION DE A. GRASOS
TRIGLICERIDOS 95-97%	LINOLEICO 50%
FOSFATIDOS 1,5-2,5%	OLEICO 19%
HIERRO 1-3%	PALMITICO 11%
M. INSAPONIFICABLE 1,0%	LINOLENICO 10%
	ESTEARICO 4%

UTILIZACION DEL ACEITE DE SOJA CRUDO: SE LO UTILIZA PARA LA ELABORACION DE : ESTEROLES, ACIDOS GRASOS GLICEROL. DEBIDO A QUE ES COMESTIBLE LUEGO DE SER REFINADO SE LO UTILIZA PARA: ACEITES PARA COCINA, MAYONESAS, MARGARINAS, ACEITES PARA ENSALADAS, ELEMENTOS PARA REPOSTERIA,ETC.

- The factors affecting the concentration or dilution of pesticide residues in the PPF are various depending on; (i) pesticide (ii) process applied, (ii) commodity and (iv) degradation processes involved.

- In the apple and orange juicing processes studied a dilution was the general effect. It means PF lower than 1. In general PF of 20-30% are common but lower values were also detected (in especial in the case of orange juice).

- For wine production, with yields of around 70%, the PF are in general close to 0.5. Higher values up to 1 are obtained with pesticides with low Kow and high water solubility. Only in a few cases, fermentation processes have a significant effect in pesticide degradation.

-The low yield obtained for olive oil production lead to an important concentration of the pesticide residues with PF from 2 to almost 6.

-An acceptable linear trend of the Log Kow versus pesticide distribution is noticed. It can be used as a rough estimation of the residue distribution. That behavior could be used for risk assessment purposes.

-Further evaluations should be considered for setting MRLs on processed commodities in specific cases.

-Furthermore studies on the most frequent transformation products are needed in setting those MRLs.


Kow