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Used Pesticide Packaging Management in Portugal: An Analytical Method for the Determination of Contaminant Levels

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Pesticides

Products intended to protect plants and agricultural production

Herbicides

Insecticides

Fungicides

Etc.

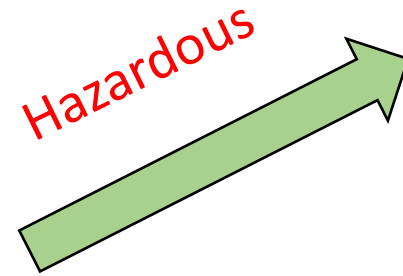


Most are toxic to non-target organisms

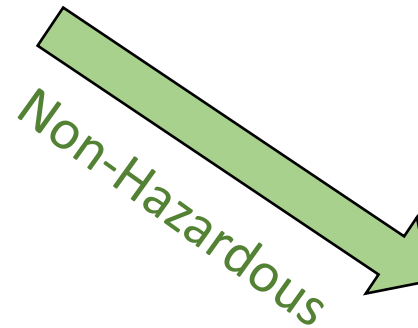


Pesticide Packaging Fate

Empty packaging can be contaminated



Destruction
Incineration



Recycling

Pesticide Packaging Classification (EU)

L 370/44

EN

Official Journal of the European Union

30.12.2014

COMMISSION DECISION

of 18 December 2014

amending Decision 2000/532/EC on the list of waste pursuant to Directive 2008/98/EC of the European Parliament and of the Council

(Text with EEA relevance)

(2014/955/EU)

15 01	packaging (including separately collected municipal packaging waste)
15 01 01	paper and cardboard packaging
15 01 02	plastic packaging
15 01 03	wooden packaging
15 01 04	metallic packaging
15 01 05	composite packaging
15 01 06	mixed packaging
15 01 07	glass packaging
15 01 09	textile packaging
15 01 10*	packaging containing residues of or contaminated by hazardous substances
15 01 11*	metallic packaging containing a hazardous solid porous matrix (for example asbestos), including empty pressure containers

19.12.2014

EN

Official Journal of the European Union

L 365/89

COMMISSION REGULATION (EU) No 1357/2014

of 18 December 2014

replacing Annex III to Directive 2008/98/EC of the European Parliament and of the Council on waste and repealing certain Directives

(Text with EEA relevance)



Most strict limit is 0.1% (weight /weight)

Triple Rinse



Reduction of leftover pesticide in the packaging



Beneficial to the farmer



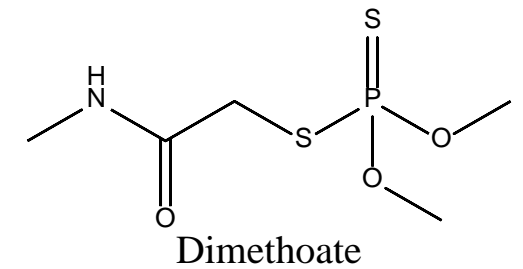
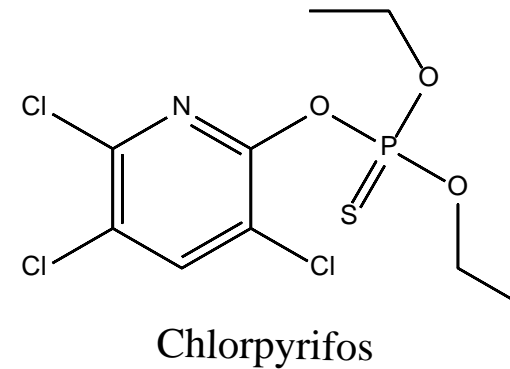
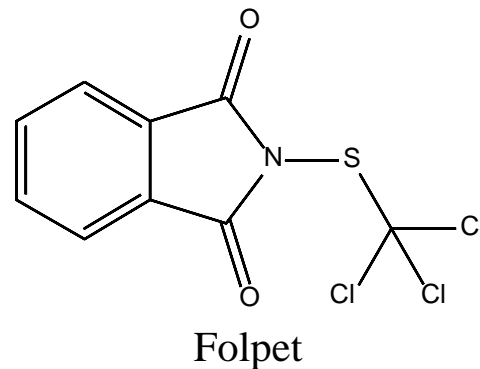
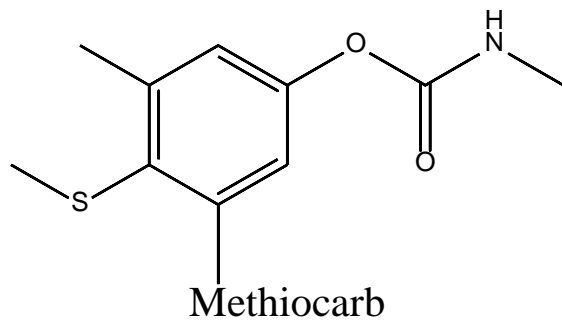
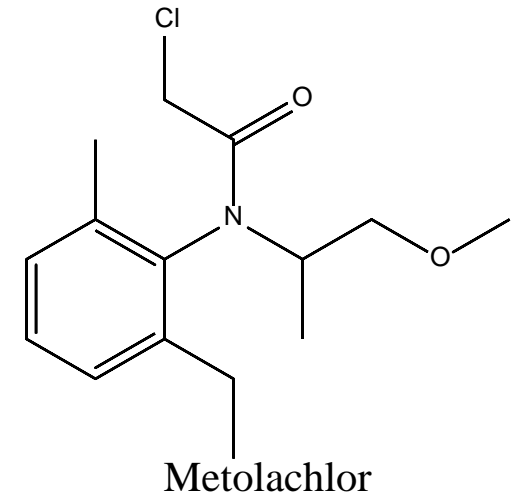
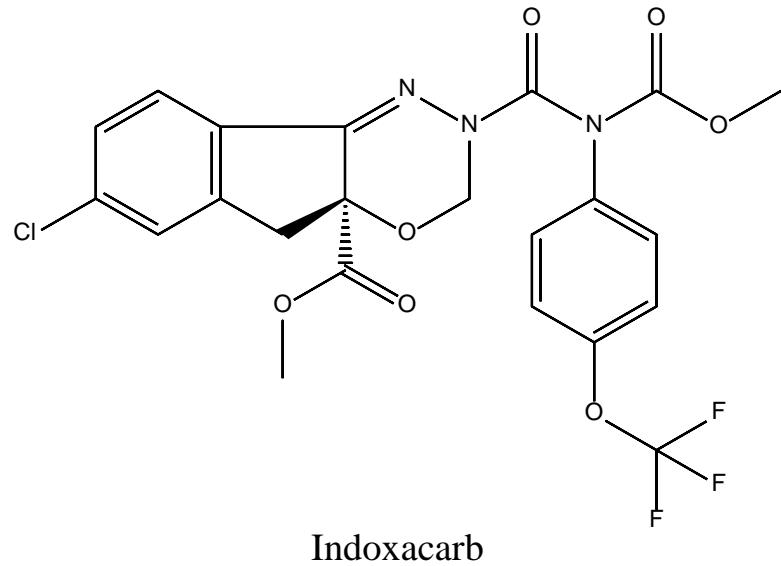
There is a need to monitor adherence to the practice



Work Objective

Quantification of 32 pesticides in recovered packaging

Analytes chosen based on usage volume and hazardousness



Collections

2018



2019



Whole
Material

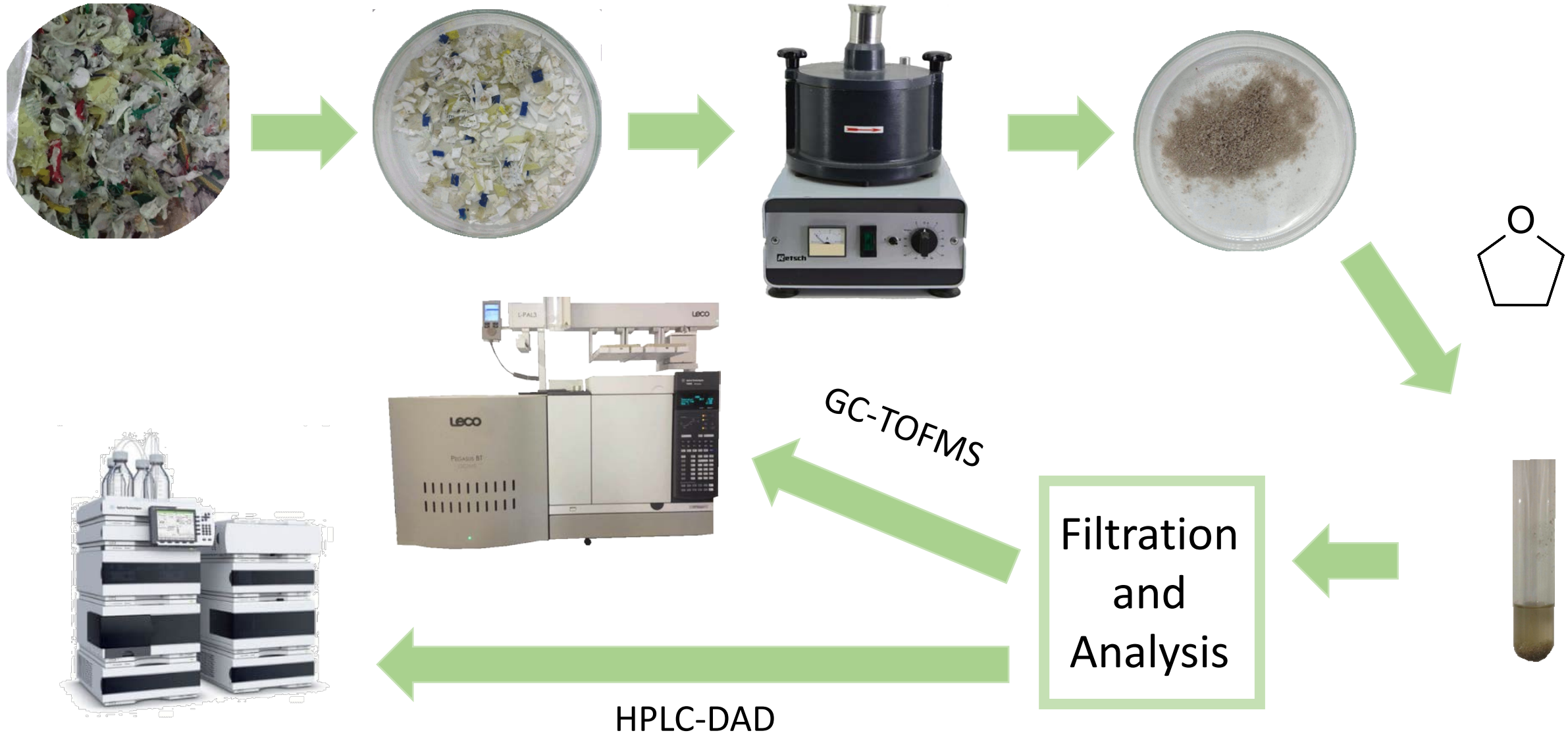


Mixed
Material

2020-21



Workflow



Pesticide Packaging Management

Table I. Quantification results for all collections. Only the highest value from each sample (per analyte) is displayed. The maximum sum was calculated considering the compound respective LOQ value, whenever the analyte was below this value.

	1	2	3	4	5	6	7	8
Compound	mg/kg							
Acetamiprid	-	<LOQ	-	-	-	-	-	-
Bromoxynil Butyrate	-	-	-	-	19	-	-	-
Bromoxynil Octanoate	-	-	-	-	-	10	-	-
Chlorantraniliprole	<LOQ	-	-	-	-	<LOQ	-	-
Chlorthalonil	-	-	-	<LOQ	-	30	<LOQ	<LOQ
Chlorpyrifos	18	19	164	<LOQ	-	13	-	<LOQ
Deltamethrin	-	33	45	-	<LOQ	-	-	-
Diflufenican	77	289	130	18	9	82	20	23
Dimethoate	-	<LOQ	<LOQ	<LOQ	<LOQ	-	<LOQ	-
Fenpyroximate	<LOQ	<LOQ	258	-	-	-	-	-
Fluazifop-p-Butyl	32	39	124	-	<LOQ	-	-	-
Folpet	-	-	15	-	-	-	-	-
Indoxacarb	41	419	211	<LOQ	<LOQ	-	-	-
Linuron	<LOQ	<LOQ	<LOQ	<LOQ	-	<LOQ	<LOQ	<LOQ
Methiocarb	1209	174	2144	<LOQ	23	<LOQ	-	<LOQ
Metolachlor	<LOQ	<LOQ	<LOQ	<LOQ	<LOQ	173	120	151
Metribuzin	127	26	818	29	<LOQ	<LOQ	<LOQ	<LOQ
Penconazole	<LOQ	<LOQ	<LOQ	<LOQ	-	-	<LOQ	<LOQ
Penoxsulam	-	<LOQ	-	-	-	-	-	-
Spinosyn A	149	-	-	-	-	-	-	-
Tebuconazole	-	-	9	-	10	22	-	-
Terbuthylazine	-	-	<LOQ	-	<LOQ	22	<LOQ	<LOQ
Thiacloprid	<LOQ	<LOQ	104	-	-	-	-	-
Thiamethoxam	17	80	70	-	-	-	-	-
Triclopyr	-	<LOQ	<LOQ	-	-	-	-	-
λ-Cyhalothrin	<LOQ	43	43	<LOQ	<LOQ	<LOQ	-	-
Sum	2041	1661	4332	189	180	521	223	284

Conclusions

The methodology developed is fit for its intended purpose

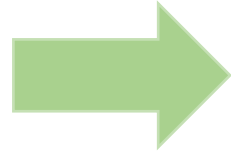
The most critical steps are sampling and milling

The analyte list needs to be updated as new pesticides become more relevant



Thank You!

Extraction: Milling

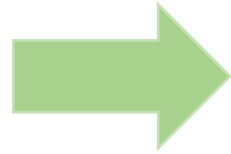


Retsch CryoMill

Small Chamber

Very time consuming

Heterogenous product



Retsch Centrifugal Mill

Sample heats up

More Homogeneous

Less time consuming

Extraction: Recovery

Different amount of milled material tested

Preliminary results showed very high %RSD because of uneven particle size

0.15 g extracted with 5mL Tetrahydrofuran solution

