

# Crop Protection Plastic Containers

The case for a non-hazardous waste classification





### **ECPA network mission**

The European Crop Protection Association (ECPA) acts as the ambassador of the crop protection industry in Europe and represents the industry's European regional network. We promote agricultural technology in the context of sustainable development and, in doing so, seek to build understanding of our role, recognition of our contribution, and informed dialogue about our views, values and beliefs.

- We represent our industry in relevant European fora and towards our major stakeholders.
- We lead and co-ordinate a European network of member companies and national associations, who act as our local representatives.
- We endeavour to listen and learn from our stakeholders and seek to understand their interests, views and perspectives.

ECPA advocates EU policies and legislation that uphold a science and risk-based approach, foster innovation, operate in a predictable and proportionate way, enable the industry to perform efficiently, protect intellectual property and reward the introduction of new technologies and practices.

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# 1 Executive summary

Packaging plays a key role in protecting users, the public and the environment from dangerous preparations but ultimately it becomes waste. To preserve this valuable resource members of the European Crop Protection Association (ECPA) have adopted a *discovery to recovery* approach to the stewardship of the packaging that they use.

From the beginning, all the industry's containers meet a voluntary standard that ensures they are easy to empty, drain, rinse and recycle. As a result, farmers can effectively decontaminate containers after emptying by rinsing and draining. The water from rinsing is applied with the spray mix to the crop so that no additional waste is produced. Rinsing also ensures that the farmer does not leave any valuable product behind in the container.

To ensure the safe collection and recovery of decontaminated containers from farms, ten schemes have been established by the industry in the European Union (EU) and others are planned.

Farmers benefit, the environment benefits.

However the operation of these schemes is being jeopardised by some countries deciding that decontaminated plastic containers are hazardous waste. The additional licensing and logistics requirements resulting from a hazardous waste classification would significantly increase costs and reduce the number of suitable collection sites. Some schemes might become uneconomic and have to close as a result.

Inevitably farmers and the environment would be the losers.

To provide a basis for discussion with regulators ECPA has carried out extensive waste classification work using current EU laws. This research has revealed that:

1. In general, individual decontaminated crop protection plastic containers produced on farms are non-hazardous waste. Most of the container waste has a large safety factor which results from the effectiveness of rinsing as a means of decontamination and the threshold levels in the European Waste Catalogue (EWC).<sup>1</sup>

Even the very strict limit of 0.1% required for a non-hazardous classification of containers that contained T+ products is met after a correct decontamination.

2. Consignments of shredded containers arising at collection sites are non-hazardous.
3. Schemes have already developed and implemented a number of effective methods for avoidance of potential risk associated with the collection of container waste.

The industry therefore maintains that it is proportionate with the risk involved and benefits that could accrue if all decontaminated crop protection plastic containers were recognised as non-hazardous waste across the EU. This would be in complete accord with the Food and Agriculture Organization of the United Nations (FAO) policy defining rinsed packs as non-hazardous.

A uniform EU approach enables a clear message to be given to farmers regarding the need for and benefits of container decontamination.

Farmers benefit, the environment benefits.

ECPA proposes that the European Commission takes action both on making container rinsing a legal requirement and ensuring that a non-hazardous waste classification for decontaminated crop protection plastic containers exists in all Member States.

<sup>1</sup> Commission Decision 2000/532/EC and its amendments

## 2 The European Crop Protection Association (ECPA)

ECPA is the pan-European voice of the crop protection industry. Its members include both national associations and market leading companies throughout Europe, including Central and Eastern Europe.

ECPA knows that the case outlined in this report has the support of its members, distributors and farmers and the waste companies contracted to collection and recovery schemes across Europe.

## 3 Purpose of this report

The purpose of this report is to inform and convince European Regulators that decontaminated crop protection plastic containers should be classified as non-hazardous waste throughout the EU.

## 4.1 Scope

The report concerns primary plastic container waste arising from the use of crop protection liquid or solid products that are diluted with water prior to application in Europe.

Secondary and tertiary packaging which is not contaminated is non-hazardous and is therefore excluded from this report.

Note: All other crop protection primary packaging waste should be disposed of according to the instructions on the product label or the material safety data sheet and does not form part of this report.

## 4.2 Definitions

**Decontaminated:** Means that the empty container and its cap have either been triple or pressure rinsed or rinsed with a system that is an integral part of the sprayer.

**Note:** The contaminated rinse water is added to the spray tank and sprayed onto the target with the rest of the spray liquid and is therefore not waste.

**Crop protection plastic container:** The primary packaging that comes in direct contact with the crop protection formulation.

**Non-hazardous waste:** Defined by reference to the Hazardous Waste Directive (HWD)<sup>2</sup> and the European Waste Catalogue (EWC).

**T+ active ingredients:** Throughout this report reference is made to "T+ active ingredients". This general expression is used to describe those active ingredients which, when classified according to the Dangerous Substances Directive (DSD)<sup>3</sup>, are T+ (very toxic) and give rise to risk phrases R26, R27, R28, R39. The threshold limit for waste containing this type of dangerous substance is => 0.1% w/w of the waste.

**European Union (EU):** In this report the acronym 'EU' includes both current and any candidate countries.

## 4.3 Structure of the report

From this point forward the report is presented in six sections:

**Section 5 - Background information on crop protection packaging:** Provides basic information on crop protection packaging, reviews the current situation and the problems that arise from a hazardous classification.

**Section 6 - The legal and technical case for a non-hazardous classification:** This is the main part of the report and describes ECPA's approach to the issue and includes waste classifications of individual containers and consignments using the European Waste Catalogue (EWC).

**Section 7 - The benefits of a non-hazardous classification**

**Section 8 - Conclusions**

**Section 9 - The way forward**

**Section 10 - References**

<sup>2</sup> Council Directive 91/689/EC and its amendments

<sup>3</sup> Directive 67/548/EEC

### 5.1 Crop protection packaging in the EU

Packaging plays a central role in the safe and effective delivery of crop protection products to the intended target whilst at the same time protecting the public, supply chain and users from the chemicals involved. Packaging also needs to be managed to meet other environmental goals, which have become increasingly important in the context of prevailing societal concerns about environmental sustainability.

Since the 1980s, industry packaging stewardship has followed a life cycle approach and been developed to include a wide range of stakeholders. Its main aim has been to achieve safe sustainable management of crop protection packaging across Europe. This includes viewing the container waste as a potential valuable resource.

To this end a ten-stage model approach has been developed which involves:

1. Joint sharing of ideas and reaching agreements with stakeholders.
2. Voluntary industry packaging design standards to prevent waste at source and facilitate container decontamination and recycling.
3. The introduction of reusable containers where appropriate.
4. Research to improve the knowledge of crop protection packaging and that of the waste stream.
5. Improving farm waste management including container decontamination.
6. Obtaining a non-hazardous classification for decontaminated containers.
7. Safe and low cost container waste collection.
8. Safe recovery (incineration with energy recovery or material recycling).
9. Performance review and continuous improvement.
10. Education and training.

Crop protection trade associations in all EU Member States have made excellent progress in implementing this approach dependent on their current country-specific requirements and laws.

France, Italy, Spain, Germany, UK, Portugal, Poland and Turkey account for the majority of packaging placed on the market. ECPA estimates that there are around 34,000 tonnes of crop protection containers placed on the European market each year.

This quantity of container waste, although large in itself, is a small proportion of the total waste produced on farms. Government figures<sup>4</sup> suggest less than 4% of all plastic and packaging waste arising on farms is derived from crop protection products.

At least 80% of crop protection containers are plastic with the majority being high density polyethylene (HDPE) with or without a barrier, followed by polyethylene terephthalate (PET), the remainder being mostly film and paper based. Plastic containers are mainly used to carry liquid products and composite film based containers to carry solid formulations.

The member companies of ECPA have developed and implemented a voluntary industry design standard for crop protection plastic containers that has subsequently been followed by the industry as a whole. The standard ensures that containers are easy to empty, drain, rinse and recycle.

As a result, farmers can effectively decontaminate empty containers by rinsing and draining. The water from rinsing can subsequently be applied to the crop and no additional waste is produced. At the same time rinsing also ensures that the farmer does not leave any valuable product behind in the container.

## Figure 1: Plastic containers for liquid crop protection formulations

Containers conforming to the **industry standard design** have:

- smooth internal surfaces,
- a large neck and
- isolated handles

to avoid trapping of formulation and facilitate rinsing.



<sup>4</sup> UK Agricultural Waste Survey 2003, Marcus Hodges Environmental for UK Environment Agency

## 5.2 The waste classification of crop protection containers across the EU

To collect up-to-date information on the situation ECPA carried out a survey<sup>5</sup> of classification in European countries in 2006. The table below gives the results.

The table shows an inconsistent approach to the classification of decontaminated crop protection plastic

containers within the EU, with at least one third of the countries classifying containers as hazardous. In a number of countries it was not possible to get a reply because regulators had not yet considered the issue.

This level of inconsistency within Europe has major current and future implications for the collection and recovery of crop protection primary containers in schemes established by the industry.

Country	Waste classification of decontaminated crop protection containers
Austria	N/A
Belgium	Non-hazardous
Bulgaria	N/A
Croatia	Hazardous
Cyprus	N/A
Czech Republic	N/A
Denmark	Non-hazardous
Estonia	Non-hazardous
Finland	Hazardous
France	Within scheme NH, outside H
Germany	Non-hazardous
Greece	Non-hazardous
Hungary	Within scheme NH, outside H
Ireland	Local Variation
Italy	Non-hazardous
Latvia	N/A
Lithuania	Non-hazardous
Luxemburg	Non-hazardous
Malta	N/A
Netherlands	Non-hazardous except T+
Poland	Hazardous
Portugal	Hazardous
Romania	Hazardous
Slovak Republic	Hazardous
Slovenia	NH but T
Spain	Hazardous
Sweden	N/A
Turkey	Hazardous
UK	Non-hazardous

N/A – not available

<sup>5</sup> ECPA Survey of Container Collection Schemes 2006

### 5.3 EU collection and recovery schemes<sup>6</sup> for crop protection containers

Schemes in the EU that collect crop protection containers:

Country	Schemes established by ECPA members	Start Date	National industrial schemes that collect crop protection packaging
Austria			ARA Ag/Bonus
Belgium	Phytophar Recover	1997	
Bulgaria			Ecobulpack
Croatia			
Cyprus			
Czech Republic			Eko-Kom
Denmark			Kommunekemi
Estonia	Operational	2005?	
Finland			Municipal
France	Adivalor	2001	
Germany	RIGK-Pamira	1991	
Greece			Herrco
Hungary	CSEBER Kht	2003	
Ireland			REPAK
Italy			
Latvia			
Lithuania			
Luxemburg	Phytophar Recover	2003	
Malta			
Netherlands	STORL	1989	
Poland	PSOR System	2004	
Portugal	Valorfito	2006	
Romania	SCAPA Pilot Scheme	2007	
Slovak Republic			Municipal
Slovenia		2005	Slopak
Spain	Sigfito	2002	
Sweden			SvepRetur
Turkey			
UK			

<sup>6</sup> ECPA Survey of Container Collection Schemes 2006

The table reveals that there are two types of schemes that are financially supported by the industry:

1. Crop protection specific schemes established by the industry and funded by an industry levy.
2. Large industrial schemes for a variety of waste streams that also collect crop protection containers and to which the industry pays a financial contribution.

Some schemes have been in existence for a number of years whereas others are in the process of being developed. The collection rates of all schemes are increasing year on year and delivering an ever-improving service to farmers. Fully operational schemes can deliver the collection service at a lower cost than farmers can achieve for themselves.

Collection schemes exist on other continents, some of which pre-date European schemes<sup>7</sup>. Almost all of these schemes have recycled the collected plastic containers from the outset and are providing the European schemes with valuable experience.

Carefully managed, the recycling in these countries has proved to be a safe way of disposing of crop protection containers with significant benefits to the environment.



<sup>7</sup> Further information on Schemes around the world can be found at <http://www.croplife.org>, Container Management

## 5.4 The effects on collection schemes of a hazardous waste classification

Clearly there is a significant difference in running a scheme for the collection of hazardous waste compared to one that deals with non-hazardous waste. If current schemes had to collect containers which were classified as hazardous the combination of new licensing and logistics requirements and their subsequent effect on scheme operational cost would mean that some schemes would close.

It has been estimated by the industry<sup>8</sup> that operational costs would increase by three to four times for a scheme based on a hazardous classification of containers.

### Licensing:

Whilst it might be possible to obtain the necessary licensing it would impose significant additional bureaucracy with an inevitable need for an increased number of staff. Additionally, licenses cannot be obtained without fees.

### Logistics:

All industry schemes operate a 'bring system' whereby farmers deliver decontaminated containers to a collection site. If the containers were classified as hazardous the number of suitable collection sites would be small in number and mean that farmers would have to travel very long distances with their waste.

One large scheme estimated that only one third of current sites would meet hazardous waste requirements. Inevitably this would lead to a reduction in farmers using schemes with the possibility of illegal disposal occurring.

For some schemes, a major reduction in site numbers would mean that they would probably not be viable.

Farmers and the environment would be the losers.



<sup>8</sup> Resource Recovery Forum: Farm packaging waste-proposals for a collection and recovery scheme, 2004

## 6 Legal and technical case for a non-hazardous classification

### 6.1 ECPA's approach to the waste classification of crop protection containers

ECPA has based its case on the following:

- The requirements and principles of EU waste legislation:
  - The Waste Framework Directive (91/156/EEC).
  - The Hazardous Waste Directive (91/689/EC).
  - The Packaging and Packaging Waste Directive (94/62/EC).
  - The Landfill Directive (91/31/EC).
- The European Waste Catalogue (EWC) and its amendments, in particular the UK Environment Agency methodology described in "Technical Guidance WM2, Hazardous Waste – Interpretation of the definition and classification of hazardous waste".
- The principles outlined in the Commission Communication of 21 December 2005, "Taking sustainable use of resources forward: A Thematic Strategy on the prevention and recycling of waste".

### 6.2 The life cycle of containers from discovery to recovery

The following flow diagram shows the life cycle of containers from discovery to recovery, the stakeholders involved and a description of the key waste management features of each step.

An examination of the container life cycle indicated that individual containers were consolidated to consignments already at farm level.



### 6.3 Legal basis for waste classification

All current EU waste laws, such as the Waste Framework Directive (WFD), are hazard based. This means that regulators do not have to consider risk-benefit arguments. However, all regulators have it within their powers to apply the law proportionally depending on the risk involved and the ensuing benefits. The Directive sets the framework for how waste is to be controlled and safely managed.

The Waste Framework Directive is general in nature and includes all types of waste. However, it does not give the specific guidance and detail needed to ensure that hazardous waste is managed safely.

Specific guidance is addressed in the Hazardous Waste Directive (HWD) which defines 14 hazard categories, including threshold limits for some of them. But many are written in general terms only.

The European Waste Catalogue (EWC) supplies a list of wastes which harmonises the requirements of the Waste Framework Directive and the Hazardous Waste Directive. Twenty sources of waste are listed with a full list of different wastes.

Many waste entries are only hazardous if the concentration of dangerous substances that they contain exceeds limits set in the EWC. Any entry marked with an asterisk is always considered hazardous no matter what the concentration of dangerous substance that it contains. The Dangerous Substances Directive (DSD) classifies substances as dangerous or non-dangerous.

The EWC provides the means by which it is possible to establish the classification of primary crop protection product packaging waste, as it links the classification of certain hazardous waste categories to the concentrations of dangerous substances within the waste.

For crop protection container waste the two lowest threshold limits in the EWC are as follows:

- “one or more substances classified as very toxic at a total concentration  $\Rightarrow$ 0.1%”.
- “one or more substances classified as toxic at a total concentration  $\Rightarrow$ 3%”.

These threshold limit concentrations have been referred to extensively within this report as they represent a “worst case” scenario.

The appropriate EWC Waste code for empty plastic containers that contained agrochemicals is 15 01 02 “Non-hazardous Plastic Packaging”.

### 6.4 The classification of individual crop protection plastic containers

Effective rinsing of packs, whether they have contained a solid or liquid formulation, is possible with modern pack and sprayer designs. It is achieved either by manual triple rinsing or mechanical integrated pressure rinsing. The quantity of dangerous substances that remains in the container after this process, either as residue after rinsing or as product migrated into the plastic, determines the classification of the empty container based on the process and limits described in the EWC.

In 1993, ECPA member companies generated extensive rinsability data on a wide range of packaging and formulations. These data were produced to provide evidence that primary crop protection product packs could be rinsed to leave behind less than 0.01% w/w of the original formulation in the pack.

An analysis of data from 180 rinsed primary crop protection product packs revealed that the average rinsing effectiveness achieved using either manual triple rinsing or integrated pressure rinsing was 0.008%. These findings

are supported by other publications<sup>9</sup> that show that crop protection product packs can be rinsed clean below 0.01%. In 2002, ECPA member companies produced another set of data analysing the total amount of active ingredient that remains in the container after triple rinsing or pressure rinsing. In addition to the findings that have been investigated in the rinsability study, this also took into account the amount of active ingredient that migrated into the plastic. The results of this study indicated that the total amount of active ingredient in correctly rinsed containers remains well under the threshold for very toxic substances of 0.1% set by the EWC. The amount of respective products sold in Europe is below 3%, with a clear decreasing tendency. For all other products a much larger safety factor exists.

These results clearly indicate that individual containers, even those that contained products with the most critical classification of very toxic, can be classified as non-hazardous after proper rinsing.

## 6.5 The waste classification of consignments of crop protection containers

Farmers deliver crop protection containers to scheme collection sites in consignments that vary in size from individual sacks containing, say ten containers, to full truckloads.

Collections at small sites are consolidated into large consignments and transported to major collection hubs for shredding or compacting to improve logistics.

Whilst it is good agricultural practice to ensure that all containers are properly decontaminated, it is unlikely that farmers would separate out any individual container for which the lowest limit of 0.1% is required. Conversely, schemes will face insurmountable practical problems in segregating these particular containers during collection.

In order to assess practically the effectiveness of rinsing in consignments a comprehensive study was initiated in 2006. Germany was chosen as it has a large, well-established collection and recovery scheme for crop protection containers called PAMIRA<sup>10</sup>. Additionally, Germany's agriculture and hence the range of containers collected are representative of many Northern European countries.

The entire agro packaging waste stream of PAMIRA was analysed. Crop protection plastic containers were shredded at hubs or collection sites to produce large waste consignments. A sampling procedure for these consignments of shredded plastic was developed to ensure that a representative laboratory sample was available for analysis.

A method of analysis to determine a range of different active ingredients in the laboratory samples was developed by BASF on behalf of ECPA.<sup>11</sup> The method has been validated for the analysis of up to 19 of the most used pesticide active ingredients in post consumer resins. The method was further expanded to include additional 19 compounds considered very toxic (T+), representing about 87% of the total amount of products sold in Europe with T+ classified active ingredients.

After completion of the work in Germany further analysis using the same procedures was carried out on containers from consignments emanating from the French collection scheme ADIVALOR<sup>12</sup> as well as from Poland and Canada.

<sup>9</sup> Efficiency of Rinse Systems for Pesticide Containers: O Mostade et al; Ministry of Small Enterprises, Traders and Agriculture, Agricultural Research Center, 5030 Gembloux Belgium. Aspects of Applied Biology 48, 1996

An Investigation into the Efficiency of Two Methods of Rinsing Empty Crop Protection Chemical Containers: A.Lavers; Shell Research limited, Sittingbourn, Kent.

ANPP/BCPC Second International Symposium on Pesticide Application Techniques, September 1993.

<sup>10</sup> <http://www.pamira.de>

<sup>11</sup> Method D0505, entitled, "Method for Determination of Pesticide Residues in Post Consumer Resins Using LC/MS/MS." Available from ECPA upon request.

<sup>12</sup> <http://www.adivalor.fr>

A total of 64 samples were analysed from consignments across Germany. The residues for non-T+ compounds of all samples were well below the 3% residue threshold that would classify the containers as hazardous.

- The residue ranged from 0 to 0.55%.
- 88% of the samples have been below 0.1%.
- 94% of the samples have been below 0.25%.

None of the sites had containers with cumulative T+ residues above the 0.1% residue threshold that would have the containers classified as hazardous.

- The residue of T+ compounds ranged from 0 to 0.063%.
- 92% of the samples had T+ concentration of <0.02%.
- All samples with a T+ concentration above 0.02% have been part of the 15% samples with the highest total residual concentration.

The results underpin the conclusion of a non-hazardous classification of empty pesticide containers.

The higher concentrations in the consignment compared to the individual containers and the large range of concentration found points out the importance of correct rinsing and incoming quality control at the individual scheme collection points.

## 6.6 Summary of Section 6

1. The European Waste Catalogue (EWC) defines processes and limits for the classification of decontaminated crop protection product containers.
2. It has been shown that correct triple rinsing or pressure rinsing is an effective way of decontamination, leading to individual containers that can be classified as non-hazardous.
3. All properly rinsed containers met the thresholds as set by the EWC. For 97% of the product containers on the market large safety factors exist and even the remaining 3% of packs that contained T+ products met the limit of 0.1%.
4. Consignments of containers are produced by farmers during the application of crop protection products. Any attempt to try to segregate certain containers would prejudice health and environmental safety.
5. The PAMIRA study confirms that consignments as a whole are non-hazardous waste when classified according to the requirements of the EWC.
6. Correct rinsing at farm level and control at the collection points is crucial to ensure the limits set by the European Waste Catalogue are met.

## 7 The benefits of a non-hazardous classification

ECPA has a well-developed and sustainable approach to the management of crop protection plastic containers that is supported by many stakeholders. The strategy has changed and been improved over time particularly addressing the need for further reductions in packaging waste and the recycling of containers.



A non-hazardous classification would:

- Ensure that a clear message continues to be given to farmers regarding container decontamination which would benefit the environment and minimise farm disposal costs.
- Assure the operation of the current collection schemes and encourage their spread into other countries within the EU increasing the amount of container waste safely removed from the countryside.
- Demonstrate that waste regulation is risk based and proportionate and does not add to EU farm costs unnecessarily.
- Provide a foundation for the recycling of crop protection plastic containers into new products to conserve valuable resources.
- Remove the need for regulators to 'police' the segregation of containers on farms.

- 8.1 The waste classification of crop protection plastic containers is inconsistent within the European Union and poses a threat to collection schemes established by the crop protection industry.
- 8.2 At least 97% (by weight) of all decontaminated crop protection plastic containers have large safety factors endorsing a non-hazardous waste classification according to current EU waste law.
- 8.3 The remaining 3% meet the very strict limit of 0.1% when correctly rinsed.
- 8.4 The removal and segregation of a small amount of containers is disproportionate to the low risk that they pose if they are collected with the 97% of containers with large safety factors.
- 8.5 Collection schemes already have controls in place to mitigate risk to farmers, operators and the environment.
- 8.6 Significant benefits accrue from having a consistent non-hazardous classification across the EU.
- 8.7 A non-hazardous classification is consistent with FAO recommendations.<sup>13</sup>

<sup>13</sup> International Code of Conduct on the Distribution and Use of Pesticides: Guidelines on Management Options for Empty Pesticide Containers, FAO 2007 (in preparation)

## 9 The way forward

The industry maintains that it is proportionate with the risk involved and benefits that could accrue if all decontaminated crop protection plastic containers were recognised as non-hazardous waste across the EU. A non-hazardous classification would encourage the decontamination of plastics containers, minimise the cost of collection schemes to farmers and ensure the safe removal of containers from the countryside.

The following steps are proposed by ECPA:

1. The EU Commission takes community-wide action on rinsing. In many EU Member States rinsing of containers is a legal requirement. To unify the situation the requirement to rinse containers should be clearly stated in all EU and national regulations.
2. The EU Commission takes steps to ensure that a non-hazardous waste classification for decontaminated crop protection plastic containers exists within all Member States.

These steps would bring the situation into line with FAO Guidelines on rinsed containers.



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