



A Stocktaking Report:  
Crop Protection Stewardship  
Activities of the Plant  
Science Industry 2005-2011



The overall aim of the stewardship approach is to maximise the benefits, and minimise any risk, from using crop protection products.

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Crop protection stewardship  
underpins the International Code  
of Conduct for the Distribution  
and Use of Pesticides



## Executive Summary

Stewardship is a lifecycle approach to product management. It is the ethical way to manage crop protection or biotechnology products from their discovery and development, to their use and the final disposal of any waste or phase-out. **The overall aim of the stewardship approach is to maximise the benefits, and minimise any risk, from using crop protection or biotechnology products.**

CropLife International, the global federation representing the plant science industry, is committed to promoting effective stewardship in and beyond the field, and believes that the appropriate management and use of the plant science industry's products helps underpin sustainable agriculture, while safeguarding the environment and public health.

As part of its commitment to increase impact and outreach of its stewardship activities, the plant science industry continuously strives to improve measurement of the effectiveness of these programmes. This report forms part of this process and provides descriptive examples and measurable results of current crop protection stewardship activities of the plant science industry.

Crop protection stewardship underpins the **International Code of Conduct for the Distribution and Use of Pesticides** (FAO, 2002). CropLife International and its member companies fully support the Code, adherence to which is a condition of membership of the federation. The Code recognises, and is mainly aimed at, those countries where good regulation or enforcement regulations are not fully developed or implemented. It is in these areas where the challenge of stewardship and measuring true impact (i.e. changes in behaviour and practices) is greatest.

Stewardship of pesticides or crop protection products can be broken down into seven interrelated elements:

1. Research & Development
2. Manufacturing
3. Storage, Transport and Distribution
4. Integrated Pest Management (IPM)
5. Responsible Use
6. Container Management
7. Management and Disposal of Obsolete Stocks

This report offers an overview of the role of crop protection and the plant science industry as the context in which stewardship activities take place, followed by a detailed description of the ways in which the seven key elements of these activities are conducted. It provides stakeholders with information about the global activities of CropLife International member companies and associations to support and promote effective stewardship of their products. However, the emphasis of the report is to provide information on the activities of the global, regional and national associations rather than the member companies, the activities of the latter being published by individual companies. The association concentrates on the latter part of the stewardship cycle – IPM and Responsible Use, Container Management and Management and Disposal of Obsolete Stocks and therefore these are the areas that are emphasised. The report also contributes to CropLife International's commitment to measure and report impact of these activities, as well as the industry's commitment to report on progress with the implementation of the International Code of Conduct on the Distribution and Use of Pesticides (FAO, 2002). It is an update of the first stewardship stocktaking report published by CropLife International in 2005 and reflects progress made since then.

## Chapter 1: Introduction

### CropLife International

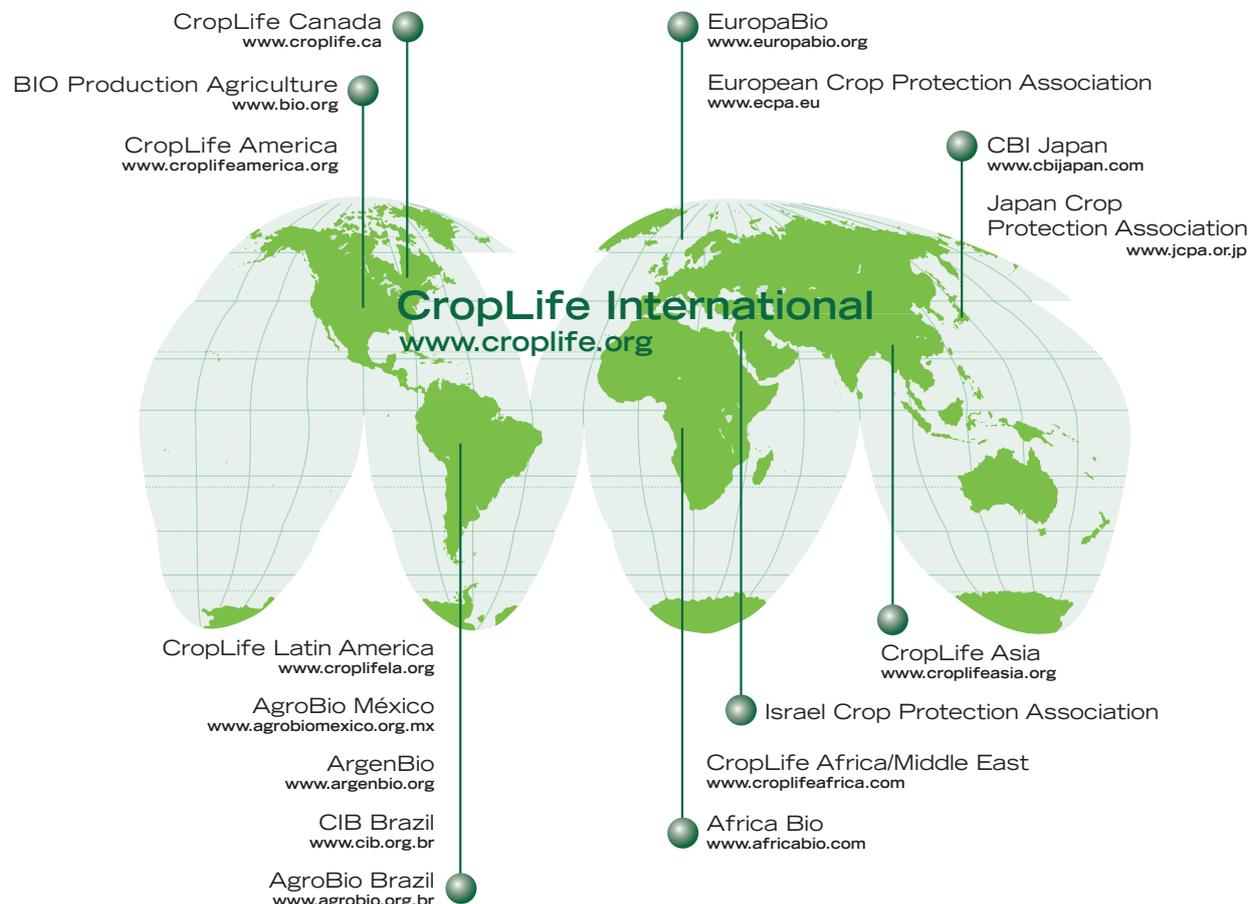
CropLife International is the global federation representing the research-based plant science industry that develops, manufactures and sells products and services designed to improve the global production of food, feed, fibre and fuel in a sustainable way. As a global network, CropLife International acts as an ambassador for the plant science industry, encouraging understanding and dialogue whilst promoting sound science and agricultural technology in the context of sustainable agriculture<sup>1</sup> and development<sup>2</sup>.

CropLife International represents a network of regional and national associations in 91 countries and is led by the major R&D-driven plant science companies such as BASF, Bayer CropScience, Dow AgroSciences, DuPont, FMC, Monsanto, Sumitomo Chemical and Syngenta (figure 1.1). These companies represent approximately 80% of total global sales of crop protection products. The member associations of CropLife International cover all major markets and are located in both the developed and developing regions (figure 1.2). Over 1,000 international, national, regional and local companies are represented by the global CropLife network of associations.

Figure 1.1: Member companies of CropLife International



Figure 1.2: Member associations of CropLife International



<sup>1</sup> There are several different definitions of sustainable agriculture. In the context of this report and the plant science industry's activities, sustainable agriculture is an approach that integrates three main objectives – environmental health, economic viability and social equity. Simply put, it aims to meet the needs of the present – production of adequate food and improving incomes and livelihoods – without compromising the ability of future generations to meet their own needs.

<sup>2</sup> The industry's commitment to, and role in supporting, sustainable development is summarised in a publicly available statement, see Appendix 1.

### Sustainable Agriculture: Crop production and losses due to pests

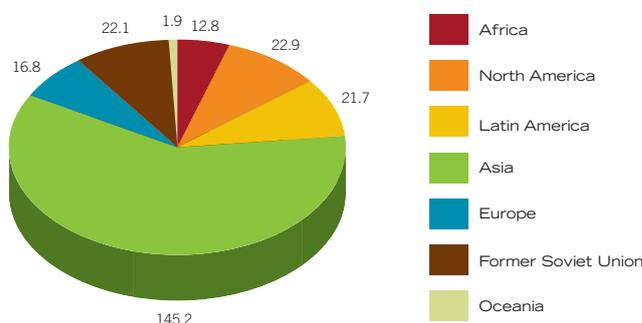
Agriculture is one of the key drivers of the global economy, and a way of life for millions. As summarised in Appendix 2, a large proportion of the world's population, and particularly those in developing countries, rely on agriculture for supporting their livelihoods. Over the last 50 years agricultural productivity has risen dramatically and production of world food calories has doubled, mainly as a result of improved technologies – particularly inputs and tools, such as fertilizers, quality seed, crop protection products, machinery and equipment combined with improved management strategies, such as irrigation management, integrated fertilisation strategies and integrated pest management.

With high population growth, diminishing arable land and growing water scarcity, farmers need to be able to produce more food on less land. Recently, this challenge has been highlighted by rising and volatile food prices and local shortages; food security for all is once again recognised as a major challenge. To feed the growing population sustainably, a broad-based approach is needed that ensures farmers have access to the tools and the knowledge to enable them to grow food, steward the land, bring in the harvest and get it to market. The plant science industry's stewardship work forms a key element of this path to increasing productivity in a way that is sustainable, safe and efficient.

Reducing losses to crop production from noxious pests (insects, weeds and diseases, including nematodes) is crucial to maintaining and increasing productivity. Between 26 and 40% of the world's potential crop production is lost annually because of the effects of weeds, pests and diseases; however, crop losses could double without the use of crop protection products. For example, crop protection practices reduce the overall potential pre-harvest losses for wheat of 50% to actual losses of 29%. In sugar beets, no crop protection measures would reduce yields by an average of more than 80%<sup>3</sup>. Additionally, some 20% of agricultural production is lost to post-harvest pest attack. This report concentrates on pre-harvest pest control.

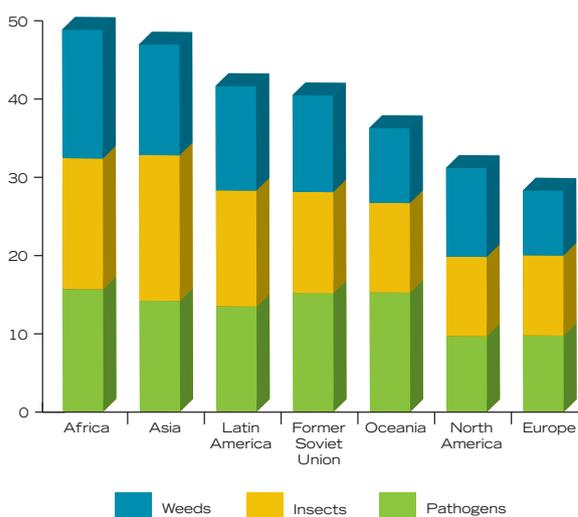
Regionally, losses in the developing countries of Africa, Asia, and Latin America – precisely those areas where agriculture is the most crucial economic activity – are considerably higher than in the developed world (figure 1.3 and 1.4). Here, many pest attacks can result in total crop loss, if not controlled.

Figure 1.3: Value of annual crop losses due to pest attack (billion US\$)



Source: E. Oerke, H.W. Dehne, F. Schonebeck & A. Weber  
*Crop production and crop protection: Estimated losses in major food and cash crops (Amsterdam: Elsevier, 1994)*

Figure 1.4: Percentage of crop losses due to pest attack



Source: E. Oerke, H.W. Dehne, F. Schonebeck & A. Weber  
*Crop production and crop protection: Estimated losses in major food and cash crops (Amsterdam: Elsevier, 1994)*

Continuous improvements in pest management and control are essential if we are to continue producing the necessary quantity and quality of agricultural output whilst maintaining environmental diversity and limiting the encroachment of agriculture onto important natural resources, such as land, soil, water and biodiversity. The plant science industry invests heavily in developing ever more sophisticated products to ensure that agricultural productivity is increased in a way that uses fewer resources and is environmentally sustainable.

<sup>3</sup> Oerke, E. C. and H. W. Dehne. "Safeguarding production – losses in major crops and the role of crop protection." *Crop Protection* 23 (2004) 275-285.

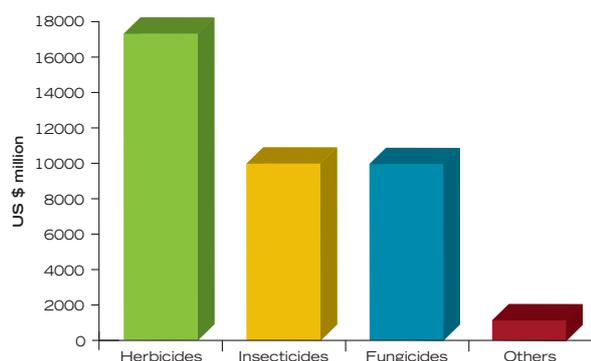
### The Plant Science Industry

The plant science industry, as represented by CropLife International, discovers, develops, manufactures and sells products and services designed to improve the productivity of food, feed, fibre and fuel. The industry performs this mission through the use of biology, chemistry, biotechnology, plant breeding and other techniques, while safeguarding human and

environmental health. This report concentrates on the role and management of crop protection products.

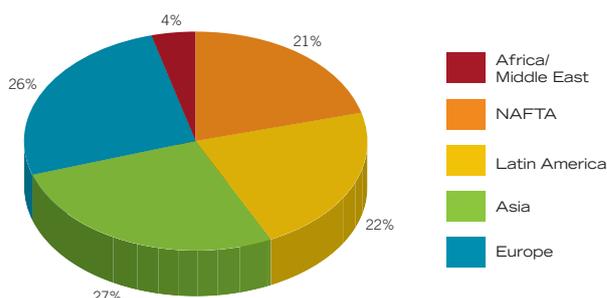
The global market for conventional crop protection products (mainly chemical pesticides) in 2009 was US\$37,860 million, of which around 46% were herbicides (figure 1.5).

**Figure 1.5: Global Crop Protection Market by Product Sector – 2010**



Source: Phillips McDougall (2011)

**Figure 1.6: Regional Market Analysis – 2010**



Source: Phillips McDougall (2011)



## Product stewardship: A lifecycle approach

Plant science stewardship is the responsible and ethical management of a plant protection or biotechnology product throughout its lifecycle.

Crop protection products and services meet real and pressing needs. They are a key element of efficient and sustainable agriculture. At the same time, these products may also have negative impacts on human health and the environment if they are not used properly. The industry is therefore actively involved in and committed to programmes that promote the effective management and responsible use of crop protection products to minimise such risk.

Stewardship is not only important to sustainable agricultural production and development, but also to sustainable business. Hence stewardship is a core element of each company's and association's business strategy, which is reflected across its range of activities.

The plant science industry promotes stewardship as a 'lifecycle' concept of product management, from the initial research and development, through distribution and use, through to the eventual disposal of any waste. Within the crop protection lifecycle, there are seven distinct interlinked elements (figure 1.7):

1. Research & Development
2. Manufacturing
3. Storage, Transport and Distribution
4. Integrated Pest Management
5. Responsible Use
6. Container Management
7. Management and Disposal of Obsolete Stocks

Figure 1.7: Key elements of crop protection stewardship



### Industry roles and responsibilities

Stewardship activities are conducted at company level as well as at national, regional and global federation level.

**Companies** – Level of stewardship involvement is dependent on phase of product and geography. Companies have almost exclusive involvement in stewardship at research, development and manufacturing phases of the product lifecycle, but are also involved in stewardship at the field level (IPM and Responsible Use, as well as the Management and Disposal of Obsolete Stocks), where they concentrate on the stewardship of individual products. This report includes case studies that illustrate the range of company activities. Although attributed to individual companies, similar approaches or activities are undertaken by all CropLife International member companies. The associations' activities complement these.

**Industry associations** – Level of stewardship involvement grows as more stakeholders become involved in the value chain through distribution, use and management of waste. There is little involvement

in research and manufacturing at the association level (figure 1.8). **This report concentrates on the latter part ('use stage') of the stewardship lifecycle (figures 1.8 and 1.9) on which the associations concentrate.** Associations also play an important role in countries where markets are not large enough for individual companies to be able to engage in large stewardship programmes. Associations do not deal with individual products, but more general aspects on stewardship principles that are relevant for all products.

The industry accepts its need to lead and to be proactive, but it also realises that no one group can meet the challenge of bringing stewardship principles to all stakeholders involved – whether responsible use by farmers in sub-Saharan Africa, management of crop protection stocks by national authorities in Latin America, or maintaining high quality standards in re-formulation plants in Asia. As the product moves down the value chain through distribution, use and disposal, more and more stakeholders are involved, over which the industry has less and less immediate control and responsibility. Nevertheless, these stakeholders need advice and involvement, which is where effective partnerships come in. Successful

**CropLife International's Stewardship Vision:**  
To be recognised as a responsible industry promoting effective stewardship programmes, which are essential elements of sustainable agriculture, food security and food safety.

**Figure 1.8: Focus of CropLife International's Crop Protection Stewardship Programmes**

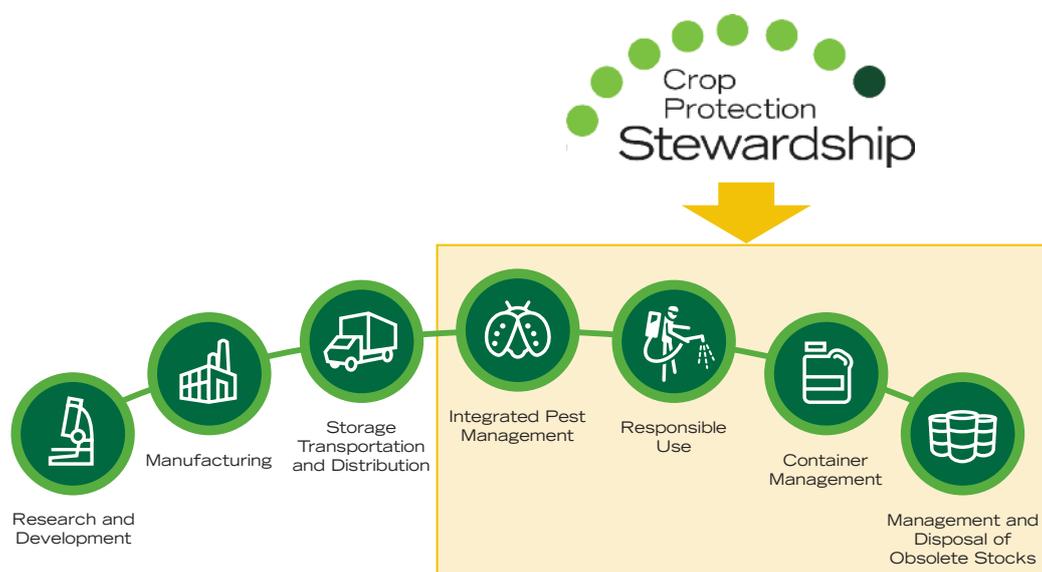
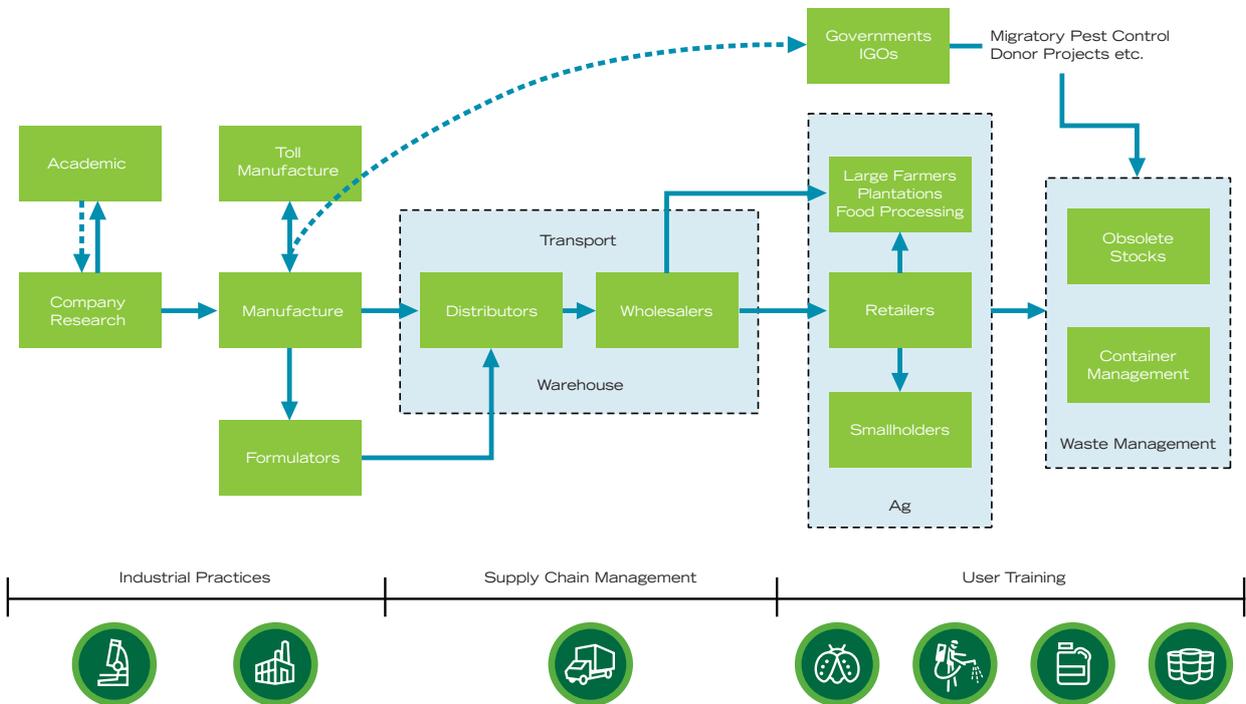


Figure 1.9: Movement of a product through the value chain



partnerships are built on transparency and mutual trust, where there is a shared sense of ownership of the programme.

It is also recognised that the challenges of promoting stewardship is greatest in developing countries (figure 1.10), where the majority of farmers are located and access to extension services and information on best practices limited. It is also in these countries that the incidence of misuse of crop protection products is highest, with resulting intoxications and environmental contamination. Thus, much of the associations' stewardship activities are focused on Africa, Asia and Latin America, although activities are undertaken, as needed, in other parts of the world. It is also in these countries that the challenge of enforcing regulation is greatest and additional voluntary standards and codes become more important.

Figure 1.10: All elements of lifecycle are covered



## Chapter 2: Measurement and Communications

### Measuring the performance of stewardship initiatives

**Measurement leads to improved effectiveness, efficiency and credibility. Credible stewardship goals facilitate the formation of meaningful partnerships that add value to the stewardship programmes. Measurement of activity, output and eventual impact also gauges the effectiveness of a programme and is an essential tool for planning.**

Measurement serves four overarching aims:

- To check position;
- To communicate position;
- To confirm priorities;
- To compel progress.

Availability of methodology and ease of measurement depend on what is being measured – activity, output or impact.

Activity measurements include methods such as counting the number of training courses held, or documenting the development of training guidelines. Output measurements can include counting the number of farmers trained or the number of publications distributed, and to whom. Impact – what all stewardship activities want to achieve – involves measuring the effect of activity and output at several levels. For example, an impact of training is an increase in trainees’ understanding and knowledge, with the ultimate aim that this increase in understanding leads to a change in behaviour, or measurably reducing the ‘environmental footprint’ or number and severity of exposure incidents.

As one moves from measurement of activity, through changes in understanding, to ultimate changes in behaviour, the difficulty and cost of measurement increases (figure 2.1). It is important, therefore, to identify appropriate indicators that can be effectively and accurately measured and where appropriate, extrapolated.

Several impacts of stewardship activity are relatively simple to measure: for example, energy efficiency at a manufacturing plant, or reduction in waste. In these areas, the industry or particular companies can demonstrate what they have achieved. However, in other areas, such as the effectiveness of training programmes that aim to improve the way farmers handle products, impact measurement needs to focus on complex changes in behaviour, which are extremely difficult and costly to track.

**Figure 2.1: An Example of Measuring Impact: Trainers, Users and other Stakeholders**



It is therefore important to draw on a range of experiences and benchmarks in other sectors to develop cost-effective and meaningful measurements, which will help to improve impact and outreach of stewardship programmes. CropLife International has drawn on its own global experience in implementing stewardship programmes over the last 20 years, plus the advice of international experts (including a stakeholder consultation held in 2005) to develop global guidelines on impact measurement. These guidelines include the need to develop robust questionnaires with non-leading questions that can be carried out on individuals or

### International Code of Conduct:

Stewardship is emphasised within the International Code of Conduct on the Distribution and Use of Pesticides, a voluntary code aimed at providing appropriate standards for the safe handling and responsible use of crop protection products, and is particularly aimed at those countries where appropriate regulation is not in place or not enforced; adherence to this Code is a requirement of membership of CropLife International. The industry is committed under the Code to report on its implementation. Effective measurement of industry stewardship activities will provide a basis for this reporting. For more information about the Code go to [www.fao.org](http://www.fao.org)

groups and that are backed up by observation. Ideally, measurement or surveys should be undertaken or be verifiable by independent third-party groups. Additionally, statistics taken from various sources can be utilised, e.g. poisoning incidents from hospital records. These different approaches are reflected in the results summarised in the present report.

Generally, the stewardship activities that are reported by companies and associations are those that go beyond what is required by local or international laws and regulations. In many countries, particularly those in the European Union, North America, Australia, New Zealand and Japan, local laws are such that few, if any, additional stewardship schemes are necessary – an example is transport regulations in Europe. In such instances, the stewardship effort is to ensure that companies, their employees and other relevant stakeholders are fully informed of, and are able to comply with, these laws and regulations. In other cases, where laws and regulations are not sufficiently enforced or appropriate, additional stewardship schemes are in operation. These schemes support the guidance laid out in the International Code of Conduct on the Distribution and Use of Pesticides. Elsewhere, voluntary stewardship schemes have been put into place, which make further legal regulations unnecessary. An example is the warehousing certification scheme in Canada (see chapter 5). The net result is that there is less information on the activities in countries which have stringent regulatory regimes.

It is mostly in the developed countries that appropriate laws and regulations or voluntary schemes are such that appropriate pesticide management is generally observed. These countries represent 70% of all products used (Appendix 2). Increasingly stewardship efforts, particularly those of the associations, are focused on developing countries (see figure 1.8), which account for less than 30% of all pesticide use. However, as shown in Appendix 2, this figure accounts for the majority of farmers (and probably individual users). In developing countries, average land holdings are often less than one hectare, compared to tens or hundreds of hectares in many developed countries (Appendix 2). These facts present significant challenges in terms of outreach and emphasise the need for all stakeholders to work together to support effective stewardship programmes.

### Data Collection

Since stewardship activities are conducted at various levels, national, regional and global, information that is truly reflective of reality must be gathered from all sources.

For both the associations and companies, the main emphasis of this report is to describe the activities

undertaken and impacts obtained from 2005 to 2011 although, where appropriate, information on previous years' activities are included to show cumulative impact. A case in point is removal of obsolete stocks, which should be a 'one-off' operation – once stocks are removed from a country and effective regulatory structures and proper stock purchase and management controls are in place, there should be no further need to undertake similar operations.

The company information including case studies contained within this report is based on information that is published either on individual company websites, in sustainability, stewardship or environmental reports or has been extracted from independent industry surveys.

The associations' information has been collected from published reports and through internal stewardship surveys and project reports.

The following chapters provide a description of each step in the product lifecycle and where possible information on performance globally is provided.

### Stewardship communications

Part of CropLife International's commitment to product stewardship includes informing stakeholders about programmes, activities and accomplishments. CropLife International conducts stewardship communications in a variety of formats, from printed publications to online videos. A few recent examples include:

- Supplying Sustainably brochure that highlights stewardship accomplishments throughout each phase of the crop protection product lifecycle.
- Research and Development in Plant Science video that showcases the complex, lengthy and resource-intensive process of identifying chemical compounds, and the extensive safety testing required for the approval of a final product.
- Farmer profiles (in both video and written format) on the benefits of stewardship, including Integrated Pest Management (IPM) and Responsible Use training, from several regions around the world.
- Fact sheet and brochures on container management programmes and achievements.
- Updated training manuals material and guidelines.
- Website materials and videos for each of the phases of the stewardship lifecycle, incorporating impact data.
- Regional associations' annual reports and newsletters, which are available on their public websites.
- IPM/Responsible Use brochures and case studies.
- Occasional articles published in international, trade and other journals and in proceedings of international and national meetings.

## Chapter 3: Research and Development

The plant science industry is constantly looking to improve the quality of its crop protection products. These advances are dependent on the research and development activities undertaken by the plant science companies and research partners, and driven by a range of fundamental environmental, social and economic pressures and trends. Good laboratory practice at this stage ensures the integrity of the data provided for product safety assessments.

### The crop protection product development process

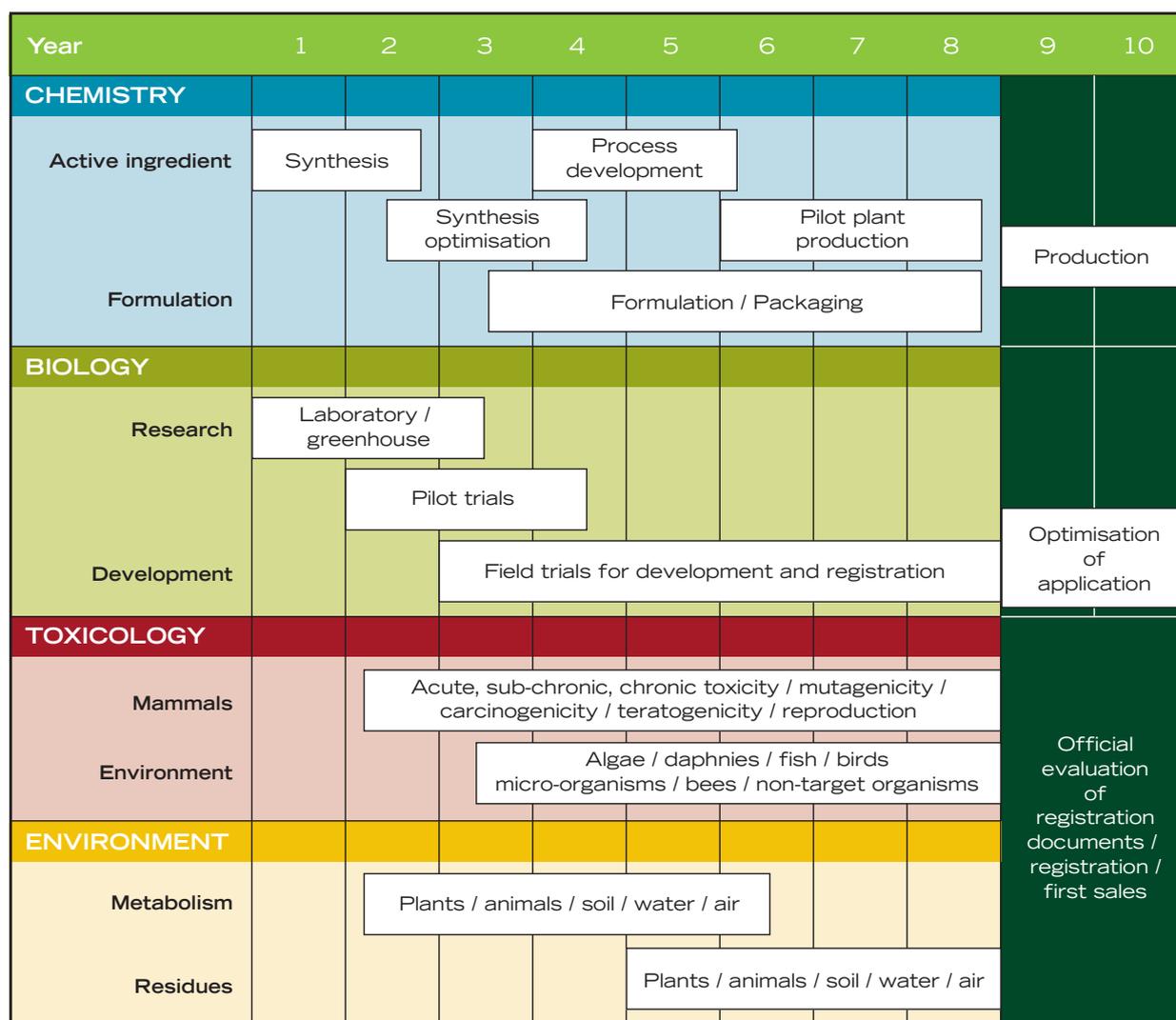
All companies are working to create new products, formulations and technologies so that they are biologically efficient, environmentally sound, user friendly and economically viable.

A new crop protection product takes nearly 10 years and US\$256 million to develop (from discovery to first sales). Of this total, as much as 57% is spent on development costs including biology/screening, toxicology, environmental chemistry and field trial costs. Approximately 120 different tests are carried out to ensure safety and efficacy. Figure 3.1 illustrates the crop protection product development process.

#### Investment in R&D

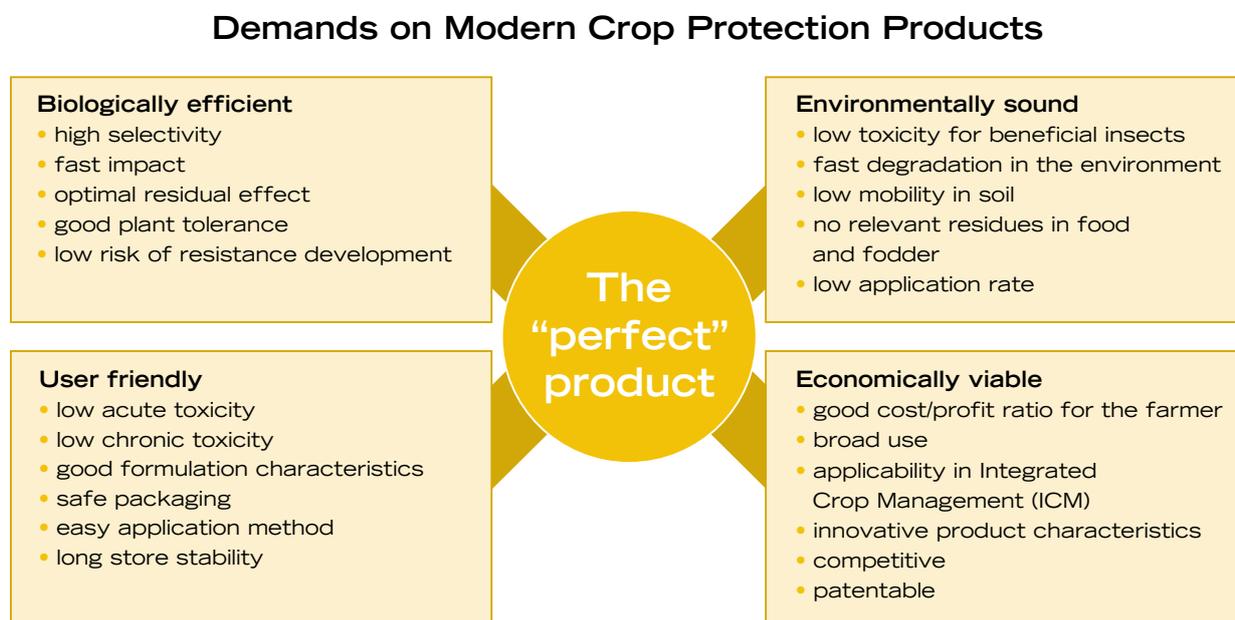
The top 10 companies of the plant science industry spend an average of 7.5% of sales on research and development for new crop protection products<sup>4</sup>. This ratio places the plant science industry among the most R&D intensive business sectors.

Figure 3.1: Development of a crop protection product



<sup>4</sup> If investment in research on new plant varieties and biotech is included this ratio reaches almost 12%.

Figure 3.2 Research goals for a new crop protection product



When developing a new chemical crop protection product, researchers look for the most vulnerable point in the pest's natural defence system and then seek to develop a molecule that will attack this vulnerable point without it impacting on other non-targeted organisms.

Once developed, the effectiveness of the molecule in controlling the target pest is tested; the molecule's toxicology and its environmental fate are also investigated. How quickly, for example, does it break down in the soil? Are any residues left on the crop? It is also vital to establish the effect that the molecule has on people, which includes the manufacturers, growers and consumers. The molecule which can be used to control the problem weed, insect or disease without affecting the wider environment, is known as the active ingredient.

The process of identifying the active ingredient is only the start of the R&D process. For every active ingredient tested, only 1 in 140,000 actually makes it to the market. This is because there are a number of different obstacles that need to be overcome before a crop protection product is clear to go to market.

The process of R&D is not focused solely on the development of new active ingredients. The plant science industry is also working on the development of new formulations that determine the physical state of the product, as well as enhancing activity and optimising application methods for new and existing products.

#### External research collaboration

The plant science industry does not conduct R&D activities in isolation. They collaborate with universities, research institutes and specialised high-tech companies, as well as investing in start-up companies and venture capital funds, and taking part in joint ventures. All these links provide the plant science companies with a source of new knowledge and technology and enhance their ability to develop innovative new products and applications. These collaborations also benefit the research partners, who gain new skills and knowledge from the activities.

#### Good laboratory practice

During the R&D phase for a new crop protection product or application, all the data must be collated to produce the dossier that will be submitted to the regulatory authorities for approval.

For the regulatory authorities to make an assessment of a particular product about the hazards and risks to users, consumers and third parties, as well as the environment, they must have absolute confidence in the integrity of the data provided by crop protection companies. To ensure this is the case, crop protection companies abide by a set of principles, known as Good Laboratory Practice (GLP, [www.oecd.org](http://www.oecd.org)), that provides a framework within which laboratory studies are planned, performed, monitored, recorded, reported and archived. It is a regulatory requirement in the European Union, and elsewhere in the world, that studies undertaken to demonstrate the health or environmental safety of new chemical substances are conducted in accordance with GLP principles.

### Measuring R&D output

Given the limitations, the plant science industry has been successful over the past half-century in reducing crop losses by continuously developing new and improved products to control pests. Some publicly available indicators demonstrate a positive R&D output, such as the number of new chemical entities approved each year. However, the complexity of trade-offs in development of new products (figure 3.2) shows that developing simple, meaningful indicators in the R&D area is extremely difficult.

### SUMMARY

Driven by a range of fundamental environmental, social and economic pressures and trends the plant science industry is continually aiming at improving the quality of its crop protection products. These advances do not focus just on crop yield, but are also geared towards meeting the sustainable development objectives of the industry and society as a whole.



## Chapter 4: Manufacturing

**Stewardship efforts at the manufacturing level focus on the sustainable use of primary inputs, and managing the waste that is generated. As well as ensuring safety to employees, the public and the environment, the plant science industry's commitment to sustainability reflects the long-standing, successful policies and practices that are in place to ensure the above goals are achieved.**

Plant science companies were among the first in the world to recognise the direct environmental and economic benefits of improved industrial processes several decades ago. For many years, companies have been making significant investments to:

- Improve energy and water efficiency
- Reduce greenhouse gas emissions
- Reduce waste
- Improve worker health and safety

CropLife International's member companies have also been active in developing mechanisms to ensure that certain environmental, worker health and safety and other social objectives are respected throughout the supply chain.

The information presented in this chapter reflects the environmental resource use from these manufacturing plants. It should be noted that in some of these plants, non-agricultural chemicals are also manufactured, making exact measurements difficult. In addition, companies also outsource manufacturing of certain products to specialist firms. The environmental resource use of this latter group of companies is not reflected in the information presented, but outsourced manufacturers are expected to adhere to defined standards.

### Resource efficiency, waste management, and emissions reductions

CropLife International's member companies make information on their environmental resource use in manufacturing operations publicly available. Company reports are available via the internet or by request to the individual companies.

The companies have established objectives in four key areas:

- Energy consumption
- Greenhouse gas emissions (direct and indirect through energy use)
- Water use
- Waste generation

To achieve these objectives and targets, many

companies have changed manufacturing and other technological processes of existing plants and incorporated ambitious targets into the research and planning of new facilities.

Each company uses different accounting mechanisms and time periods for their reporting, making aggregation impossible and comparison misleading. Data is therefore presented here in ranges, in order to give an indication of the scale of improvement in sustainable resource use over recent years.

### Energy consumption

CropLife International's member companies have been working on cutting total energy use, with several companies reporting declines in energy consumption ranging from 1.5-22% from 2008 to 2009. Energy efficiency improvements ranging from 22-31% have also been reported over various periods since 1994.

### Greenhouse gas emissions

From 2008 to 2009, total emissions of greenhouse gases (GHGs) have been reduced by 5-15% across major CropLife International member companies. Over various periods since 2000, reductions in GHG emissions ranging from 12-29% have also been reported.

### Water consumption

Water is used by the industry to heat and cool equipment, for cleaning and in the generation of chemical reactions. Water is also an important ingredient in products, although increasingly products contain less water and are available in a more concentrated form.

Investments to reduce overall water use through the re-use and recycling of water have resulted in several companies reporting reductions in water consumption of 6-10% annually over the past few years. Many plants now also have their own water treatment processes to minimise the impacts of any wastewater discharged to other treatment works or the environment.

### Waste generation

The manufacturing of crop protection products results in unwanted by-products that require disposal.

Several member companies have reduced the amount of waste generated annually by 4-15% over the last several years. This is largely due to new processes and technologies to reduce the amount of waste produced and to find synergies that allow waste to be re-used or recycled as a useful product or raw material.

### Health, safety and welfare

CropLife International member companies each employ between five and twenty thousand people in this working area, across most countries in the world. All companies are required to comply with local labour and health and safety laws.

All member companies have employee programmes for continuous improvement in place in order to reduce occupational accidents and illness. Companies are now reporting injury and illness rates in the order of 1.4 – 3.4 injuries or illnesses per one million working hours.

The approach adopted by member companies has been expanded to address a myriad of additional health and welfare concerns including work-related stress and addressing work/life and gender balance issues.

### Responsible Care

Responsible Care is a programme developed in the late 1970s by the chemical industry to assist companies in improving their environmental, health and safety performance (see [www.responsiblecare-us.com](http://www.responsiblecare-us.com)). All CropLife International member companies participate in Responsible Care, or similar local/national programmes.

The programme requires companies to report on performance in the following areas:

- Community awareness and emergency response
- Research and development
- Manufacturing
- Transportation
- Distribution
- Hazardous waste management

The scope of these six codes is mainly limited to the manufacturing facility – for example, the research and development code is aimed at ensuring that research activities do not pose a hazard to people and the environment.

### Industry guidelines and standards

In order to assist its member companies, CropLife International associations have established guidelines and standards for the manufacture, formulation and packing of crop protection products. These guidelines and standards extend beyond the primary manufacturers to include third-party suppliers as well as the formulators of crop protection products. They cover areas such as training, auditing, location and buildings, organisation and management, safety and occupational health, and environmental protection.

Where these standards and guidelines are in place, they extend beyond the scope of existing legislation governing the manufacture of crop protection products, encouraging the industry to set goals that exceed current regulations.

### SUMMARY

The plant science industry places a great deal of emphasis on addressing the challenges of sustainable agriculture. This direction was motivated by a growing awareness of the negative impact of pollution on the environment, as well the recognition that the shift away from inefficient production processes can be an important source of cost savings. The chemical industry has also been one of the most progressive and diligent in responding to increasing concerns about health and safety. The industry has addressed these concerns by transforming the way it and its suppliers engage in the manufacture of crop protection products and the processes they employ.

## Case Study

### Sumitomo Chemical's Eco-First Commitments

In parallel to Responsible Care, Sumitomo Chemical is committed to fulfilling the Eco-First Commitments to the Japanese Government. Among others, these include reviewing all safety information on products sold in annual amounts of a ton or more by 2016 and conducting appropriate risk assessment by 2020. Working to improve energy consumption levels by 25% and CO<sub>2</sub> emissions by 20% over 1990 levels by 2015. Reducing waste and promoting recycling, aiming at achieving a 90% reduction in industrial landfill relative to 1990 levels by 2010 and to reduce the ratio of landfill to total waste generated to less than 3% by 2015.

## Chapter 5: Storage, Transport and Distribution

**CropLife International supports the establishment and enforcement of an effective and appropriate regulatory environment with regard to the storage, transport and distribution<sup>5</sup> of crop protection products. Voluntary stewardship initiatives complement this regulatory regime by ensuring that crop protection products are handled safely to protect the environment and safety of workers and the public.**

### Storage

CropLife International's member companies have in place guidelines and standards for the storage of crop protection products. These are sometimes complemented by association guidelines that aim to assist local companies and distributors meet legislative requirements or go beyond compliance standards.

The guidelines and standards cover two main elements: physical infrastructure and warehouse management/safe storage.

Physical infrastructure guidelines and standards address areas such as:

- Location of warehousing facilities – away from houses, schools and shopping areas
- Access – areas for easy loading and access for emergency vehicles
- Construction material – non-combustible and heat resistant
- Flooring – impervious to liquids

The buildings should also be designed to contain the spread of fire and product spillage through, for instance, the construction of firebreak walls and catchment basins – these allow product spillage and water used in combating any fires to be retained for safe disposal.

Appropriate warehouse management ensures safe storage through guidelines covering:

- Appropriate storage of crop protection products – whether indoor or outdoor, separated or segregated, etc.
- Security of the facilities
- Proper receipt and dispatch of products

Successful warehouse management requires employees trained in safety techniques and practices; and to ensure that these standards are constantly met

through the establishment of effective management control mechanisms. These techniques and practices cover a number of different areas, from the need for electrical maintenance to be conducted solely by qualified electricians, to the use of flame-proof forklift trucks and the need for strict standards in relation to hygiene and the use of protective equipment.

Although the objective is to eliminate the possibility of accidents, effective warehouse management must also assume that such accidents may take place. This is why staff and facilities should be able, in terms of both training and equipment, to contain and clean up spillages and fires. Each facility should have an emergency plan and employees should also take part in regular emergency drills.

Storage facilities are regularly inspected by third parties, as in the Canadian warehouse standards scheme, or by individual companies. In the Canadian scheme CropLife Canada member companies will only deliver products to a warehouse that has been inspected and approved by the warehouse standards scheme.

### Transport

There are two fundamental elements to the transportation of crop protection products: (1) the preparation, loading and unloading of the goods for transport, and (2) their subsequent carriage. It is vital that there is effective management of both of these functions and the transportation process as a whole if the possibility of an accident taking place is to be minimised.

Fundamental considerations for the preparation and loading of crop protection products include:

- Packaging quality – should be adequate for the distance and type of journey, including the quality of roads.
- Product labeling – should be clear to ensure all who handle the goods are aware of any associated risks.
- Equipment and handling methods – large drums should not, for example, be pushed off the back of a lorry and pallets must be free of protruding nails or splinters.
- Environmental effects – exposure to direct sunlight, for instance, may increase the instability of certain products and increase the risk of a fire.

<sup>5</sup> Distribution is understood in this context as referring to the role played by distributors of crop protection products.



Assuring proper and safe storage, transport and distribution of crop protection products is key to the plant science industry and its associations.

Safety considerations for the transportation phase include:

- Suitability of the driver – must be healthy and adequately trained.
- Suitability of the vehicle (generally a lorry) – must be in good working order, contain all necessary safety equipment and be appropriate to the load being carried.
- Journey route – the safest route for the journey must be identified.
- Load security – stowing and securing of loads must be done in the safest way possible. Drums should not, for example, be loaded onto cardboard boxes and they should be secured to prevent movement during the journey.
- Vehicle labeling – must be appropriate (usually with pictograms) and carry paperwork indicating type of material being transported and handling guidelines.

If an accident does occur, it is essential that the

appropriate actions take place as quickly as possible. Speed is of the essence in ensuring that accidents do not escalate. These actions require the driver to contain any spill by, for example, covering the dust or powder with sand or earth and even building a small dam for larger spills. Fires are often caused by electrical faults so the driver should disconnect the battery and any fire itself should be tackled using powder, foam or water sprays. In tackling an accident it is essential that the driver takes the necessary safety precautions, including the wearing of protective clothing and breathing apparatus when tackling a fire. The process of containment and subsequent clean-up following an accident should be conducted in accordance with guidelines specific to each product and, where possible, with input from the emergency services and crop protection accident specialists.

The plant science industry and CropLife International member companies report on a set of quantifiable goals of reducing transportation accidents (e.g. see case study below).

## Case Study

### Reduction of transportation accidents

BASF has set itself the objective of reducing the rate of transportation accidents per 10,000 shipments by 70% by 2012 compared with 2003. In 2008, there were 0.28 transportation accidents per 10,000 shipments, marking a 50% reduction in accidents already since 2003<sup>6</sup>.

BASF's globally binding criteria for the transportation and storage of chemical products (BASF Transportation and Distribution Safety Guide) form the basis for all its transport safety measures. Its global network of distribution safety officers also plays a key role. Distribution safety officers ensure that national and international regulations are observed for all shipments. In the event of an accident, the distribution safety officers collect and evaluate all the necessary information.

To achieve its goal BASF is working even more closely with its logistics partners. To do this it uses a Safety and Quality Assessment System (SQAS) as well as providing training measures for employees and carriers. European logistics partners have, for example, for the first time attended training provided to BASF distribution safety officers.

BASF introduced a similar system for checking transportation companies in Asia in 2005, the "Road Safety Assessment" (RSA) and successfully established a process in China in 2007 whereby independent reviewers assess carriers, the results of which can be used throughout the industry. To promote distribution safety in Asia Pacific, BASF has organised special roadshows in various countries including Thailand, Malaysia, Japan and Korea since October 2007.

Along with well-trained employees and partners, safe transportation routes are also important. In 2003, for instance, BASF's Malaysian joint venture BASF PETRONAS Chemicals began reviewing all key road routes in order to suggest to the appropriate authorities ways of minimising risk.

BASF has also established a global network of 24-hour emergency contact numbers and control centres that enable employees and customers to draw on their emergency response expertise if an accident does occur.

<sup>6</sup> This figure is for all chemicals, not just agrochemicals

Distributors are the most immediate contact point for growers and are therefore ideally positioned to convey key messages on the way in which growers should handle crop protection products.



### Distribution

Distributors and retailers have a crucial role to play in ensuring that the highest safety and environmental standards are realised in relation to the storage, transportation and use of crop protection products. Also, distributors are the most immediate contact point for growers and are therefore ideally positioned to convey key messages on the way in which growers should handle crop protection products. In one recent (2010) project survey of 1,000 farmers in Andhra Pradesh in India, over 90% gained their pest control information from the pesticide retailer.

To encourage the highest standards, and to eliminate any instances of malpractice, distributors of crop protection products are expected to abide by a wide range of voluntary and mandatory measures. They must not, for example, allow the re-packaging or decanting of pesticides into food or beverage containers. Distributors should advise their customers on how best to manage the purchase and use of crop protection products so as to ensure that they do not build up unnecessary stocks.

Communication is essential if distributors are to fulfill

their safety and environmental obligations in relation to customers. This is why such a strong emphasis is placed on the way in which crop protection products are advertised, packaged and labelled. Conditions attached to the advertising of crop protection products specify, for instance, that distributors should not mislead customers as to the safety, composition or suitability for use of a particular product. In addition, any claims made in advertising must be backed by verifiable scientific evidence and no incentives or gifts may be provided to encourage the purchase of pesticides. The labelling of products should also provide customers with clear and accurate information, using both text and visual aids, as to the appropriate use of pesticides.

In addition to advising their customers, distributors must also abide by strict guidelines as to how they themselves store and manage crop protection products. Distributors should ensure that staff are adequately trained and are in a position to advise customers on the selection and use of crop protection products. These guidelines include those drawn up by CropLife International and the regional and national associations (see Appendix 4).

Dupont, in association with Farm Chemicals International and CropLife Magazine, both published by Meister Media Worldwide, has been supporting the Environmental Respect Awards. The awards started in the US in 1990 and honour dealerships that demonstrate commitment to having a clean, safe facility, emergency response plans in place, stewardship training for employees and, as appropriate, their customers. The best performing dealerships, as judged by an independent panel of experts, are given an award that recognises their commitment to stewardship and the environment. Since 1990 more than 5400 business in the US have participated, with over 300 earning state awards. In 2004 the awards were expanded globally, and now more than 28 countries participate from all agricultural regions of the world.



### Role of the association

The role of CropLife International and the regional and national plant science associations is to support and supplement the storage, transport and distribution measures and guidelines adopted by the plant science industry and government. Global guidelines have been developed and distributed by CropLife International, which form the basis of training programmes for distributors and dealer/retailers. In 2010, national associations trained over 7,000 pesticide dealers/retailers around the world. Between 1998 and 2004 CropLife International distributed to various stakeholders around the world 5,700 copies of the

guidelines for the safe transport, the safe warehousing and the safe formulation and packing of crop protection products. These, as well as other CropLife International guidelines, are freely downloadable from the CropLife International website ([www.croplife.org](http://www.croplife.org)). The role of CropLife International associations is particularly important in countries where the regulatory standards, enforcement and education levels are suboptimal. An example of the impact these efforts can have is the 90% reduction in the incidence of unsafe pesticide storage in Indian homes following training by CropLife India.

Industry associations are active partners in providing training for dealers in crop protection products in several countries; the industry is supportive of government schemes that require training and certification of these dealers. CropLife Egypt (see case study) has specifically adapted the global training guidelines to provide the required training for certification of dealers in that country. Some countries also require certification of warehouses that store crop protection products – national associations actively support and promote such schemes. In Canada, for example (see case study), association members will only deliver products to warehouses certified by the Agricultural Warehousing Standards Associations.

### SUMMARY

Assuring proper and safe storage, transport and distribution of crop protection products is key to the plant science industry and its associations. They have thus supported the development of, and complied with, the regulatory regimes established by international and national law and have also implemented a range of voluntary measures for their own activities, as well as those of their partners and customers.

### Case Study

#### **Dow AgroSciences' Asia Employees Commit to a Product Stewardship Day**

Dow AgroSciences employees in eight countries across Asia joined together for Dow AgroSciences' Stewardship Day on 15 October 2010 to demonstrate commitment to the responsible use of agricultural chemical products through all aspects of product stewardship, from storage to application to disposal. Dow AgroSciences' employees in Thailand, China, Malaysia, India, the Philippines, Indonesia, Vietnam and Taiwan devoted a day to communicating to farmers, customers and government officials about product stewardship. Employees gave presentations about safety measures, personal protective equipment and other stewardship topics. In addition, demonstrations of various aspects of product use, such as proper tank mixing and application techniques, were conducted at several locations. Dow AgroSciences' Product Stewardship Day was the result of collaboration with 730 distributors, dealers and retailers across Asia, as well as partnership with CropLife International and several of the countries' government agencies and plant protection departments.

### Case Study

#### **Certification of pesticide dealers in Egypt**

There are approximately 4,000 pesticide dealers in Egypt. However, until recently, many were not qualified to handle, sell, transport, and store pesticides safely. Starting in 2001, a partnership between CropLife Egypt, Egyptian Seed and Pesticide Traders Association, Development Alternatives International and GTZ began a training programme for dealers. A training manual was developed and, following meetings with government officials, the Minister of Agriculture issued a decree to establish a certification scheme for pesticide dealers. Since October 2005, the ministry requires that all pesticide dealers pass a written test for a certificate of competence to obtain a dealer's license to sell pesticides. A supervisory committee of private sector and association members was formed to help guide implementation. CropLife Egypt is undertaking a significant part of the training, as well as publishing the training manual that has been developed. Recently data programmes have continued through a partnership with ACDI/VOCA.

### Case Study 2



#### **Voluntary warehouse standards in Canada**

The Canadian Agrichemical Warehousing Standards Association (AWSA) – the largest self-regulating industry initiative in Canada – has certified 1,425 warehouses nationally for safe pesticide storage. These warehouses are audited against a rigorous set of standards every two years for HSE issues by a team of 23 trained auditors. To ensure compliance, CropLife Canada's manufacturers ship only to AWSA-certified facilities.

## Chapter 6: Integrated Pest Management, including the Responsible Use of Crop Protection Products

The responsible use of crop protection products is undertaken within the context of promoting an Integrated Pest Management (IPM) strategy, with the underlying principle that a crop protection product should only be used when necessary – ‘as little as possible, as much as necessary’.

The industry runs and supports extensive training at many levels to ensure IPM, including, when needed, the responsible use of crop protection products.

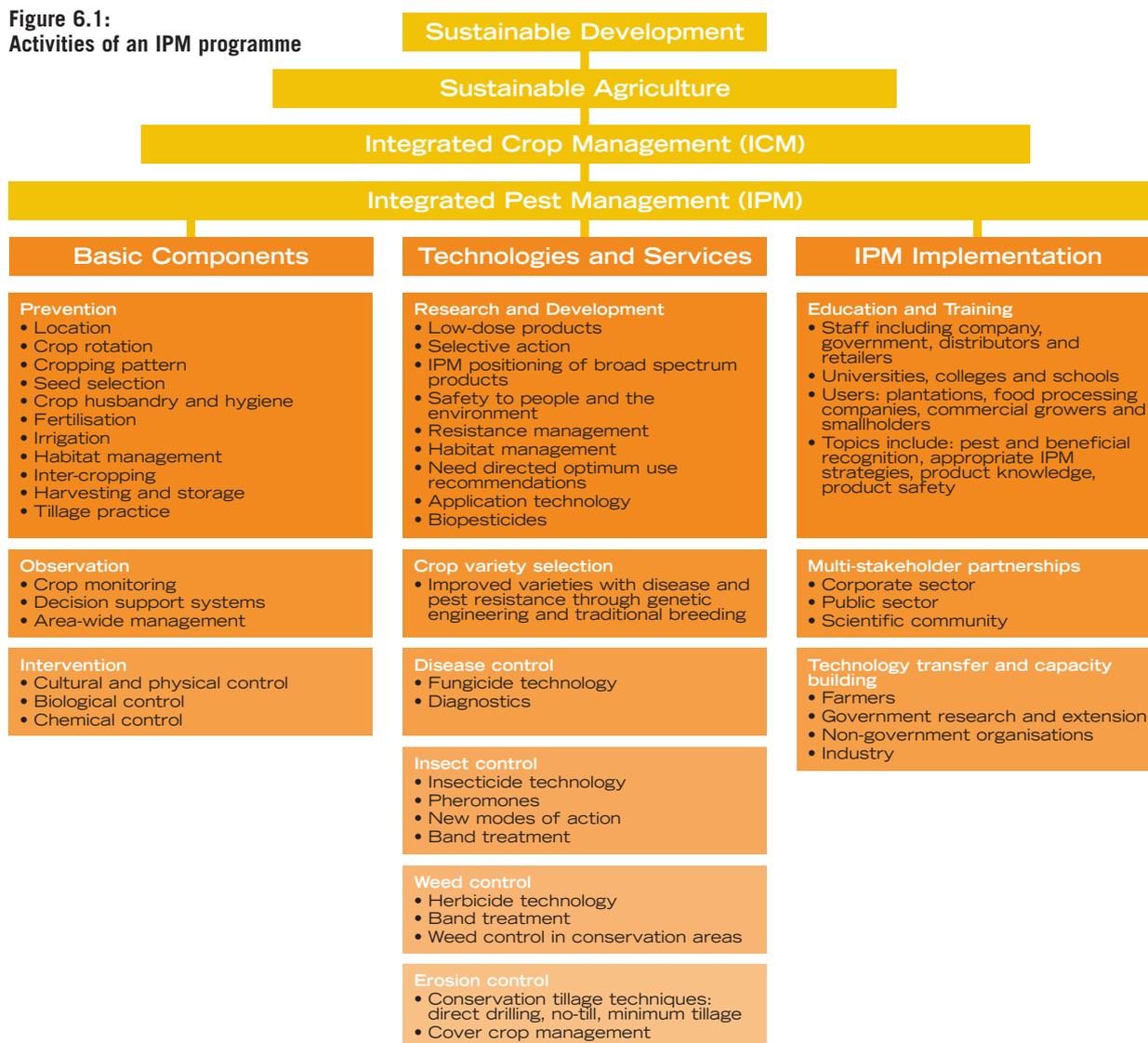
IPM is a holistic approach to sustainable crop and pest management. IPM strategies start by trying to avoid pest build-up through appropriate cultivation – ‘growing a healthy crop’. It promotes the preservation of beneficial organisms that can control pests, and the careful observation of both beneficial and pest populations. It is based on the premise, however, that

control measures have to be employed, and will be employed, when pest levels are such that they could cause unacceptably high crop losses. The plant science industry conducts both research and training in this important area.

IPM uses the best combination of cultural, biological and chemical measures, including plant biotechnology, to provide the most cost effective, environmentally sound and socially acceptable method of managing diseases, insects, weeds and other pests in agriculture. IPM strategies, therefore, recognise the important role that the plant science industry’s products play to manage and control pests, and that they need to be used appropriately, when required.

The underlying activities undertaken with an IPM programme are summarised in figure 6.1.

**Figure 6.1:**  
Activities of an IPM programme



Integrated Crop Management is a farming system that meets the requirements of long-term sustainability. It is a whole-farm strategy which involves managing crops profitably, with respect for the environment, in ways that suit local soil, climatic and economic conditions. It safeguards the farm’s natural assets in the long term. It includes practices that avoid waste, enhance energy efficiency, and minimise pollution. ICM is not a rigidly defined form of crop production but is a dynamic system which adapts and makes sensible use of the latest research, technology and advice, as well as established experience. Within ICM, pests are managed through IPM strategies.

### Who carries out IPM?

By its very nature, IPM is a local activity, carried out by farmers themselves. However, there is clearly a need to educate and encourage farmers to follow IPM principles, and to provide them with the tools to make good decisions.

### The role of the industry in IPM

The plant science industry, including both crop protection companies and their trade associations, undertake IPM research and training often as part of responsible use initiatives and in partnership with others. IPM and responsible use instruction and training cover a number of areas, including:

- General principles of IPM
- IPM strategies and tools, including:
  - Growing a healthy crop
  - Preserving beneficial organisms
  - When to apply control measures
  - What control measures are available and their effects
- How to handle and apply crop protection products safely and effectively, including:
  - Use of personal protective equipment
  - Handling instructions
  - Spray preparation and application rates
  - Periods between application and re-entry into the crop
  - Periods between application and crop harvest

The association promotes general principles of IPM; while companies integrate specific products into IPM programmes.

Ultimately, the aim is to provide farmers and others with the information and skills necessary for them to be able to make the right pest management decisions and, if crop protection products are used, that they are handled and applied safely and effectively.

However, recognising that exposure to crop protection products may occur through accident, or self-infliction, users and medical practitioners are trained to

recognise poisoning symptoms and the appropriate treatment. The medical services have been supported through, for example, the establishment of improved toxicological information services and national databases to record poisoning statistics, as well as providing antidote kits.

IPM and responsible use training is provided to a range of individuals, depending on need. These include:

- Farmers and pesticide applicators
- Farm families
- Extension agents and trainers ('training of trainers')
- Pesticide dealers (who regularly provide advice to farmers)
- Schoolchildren ('the farmers of the future')
- Teachers
- University students ('future trainers')
- Medical personnel
- The general public

Programmes are often undertaken in partnership with other stakeholders, e.g. government extension services, NGOs and international research and development organisations or as part of a larger development programme, in order to increase impact and outreach.

The plant science industry recognises that education and training are central to the increased adoption of IPM strategies and the responsible use of crop protection products through the achievement of sustainable behavioural change. This is why, in addition to meeting their statutory obligations, the crop protection companies have a long history of running educational and training programmes focused on responsible use activities.

The activities undertaken and supported by CropLife International member companies range from the development of IPM and responsible use literature for growers; demonstrating the benefits and principles of IPM; acknowledging the dangers of misuse and unsafe storage of crop protection products to the children of

### Pictograms

Labels are the first source of information for growers on how to use and apply crop protection products in a way that is effective against the target pest, yet does not pose unnecessary risks for people or the environment.

However, what if the grower cannot read? In developing countries, low levels of literacy mean many growers cannot read the label. To help them, CropLife International companies, in partnership with the FAO, developed pictograms to show growers how to prepare and use crop protection products safely. These are now used in developing countries to support the text label.

growers; and the use of travelling education road shows (see case studies). To maximise the effectiveness of their responsible use initiatives, the companies typically draw on the expertise and resources of government, NGOs, grower organisations, academic institutions and crop protection associations. The industry has trained several million individuals over the last 20 years.

### Company activities

CropLife International member companies promote IPM both through the development of appropriate products, and also through the integration of IPM principles into their marketing and customer support services for products. The industry recognises that active endorsement and support of IPM will help to:

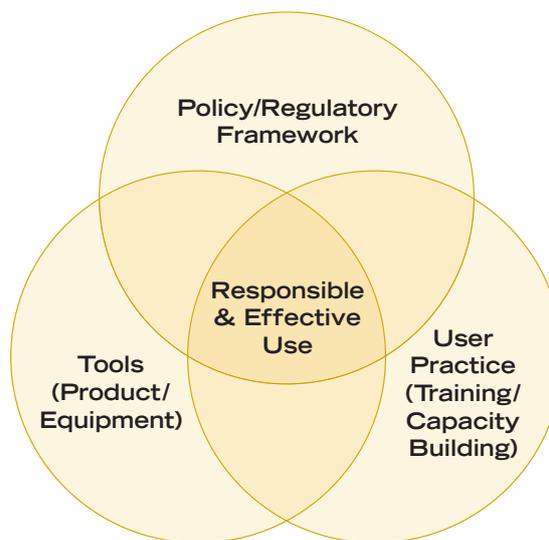
- Improve the way products are used and reduce their footprint on the environment;
- Support sustainable agriculture and the long-term viability of farming;
- Result in longer product lifecycles, for example through limiting or slowing resistance development among pests;
- Provide new opportunities for established and novel products, techniques and services;
- Increase public confidence that products are only used when necessary.

This approach reflects the definition of IPM in the International Code of Conduct of the Handling and Distribution of Pesticides, which has been accepted by member governments of FAO and WHO, as well as CropLife International and NGOs such as the Pesticide Action Network. If natural control fails and a pest control intervention is needed, chemical pesticides are the main tool that is employed. If pesticides are used they need to be handled and applied responsibly and safely.

The environmental and safety impact of crop protection products is largely determined by the way in which these products are handled and used by the distributors, and retailers, as well as the growers

themselves. It also requires an appropriate and enforceable regulatory framework that makes available good quality and effective products that are backed up by appropriate stewardship support, and removes illegal and counterfeit products that undermine stewardship and sustainable agriculture. The interaction of an **appropriate regulatory framework, availability of quality tools and equipment and user knowledge and capacity** which determine the outcome of pesticide use, has been referred to as the Pesticide Use Context (figure 6.2).

Figure 6.2: Pesticide Use Context



All crop protection products undergo stringent safety and environmental impact testing, and need to pass equally stringent regulatory requirements before they can be commercialised and used (chapter 3). Part of the registration process is the development of a label that gives instructions to the user on how the product should be used and what safety precautions should be taken. This needs to be backed up by appropriate training.

Some of the achievements of IPM and responsible use initiatives are illustrated through the following case studies.

### Case Study

#### School in the Field programme

Syngenta has expanded responsible use education to the younger generations by partnering with the Brazilian education authorities under its School in the Field programme. Almost 370,000 children have participated in the programme, with the goal of educating the next generation of farmers and, through them, influence their parents, the farmers of today.

Recognising the importance of bringing responsible use training to smallholder farmers in rural communities, Syngenta has also trained over 60,000 farmers over the past five years in the Andes mountains of Colombia, Ecuador and Peru, leading to a reduced number of health incidents related to pesticide use. This has been done with the help of training materials translated in the local Incan language, Quechua.



During the period 2005 to 2010, over 1.3 million individuals have been directly trained by the initiatives supported by CropLife International and implemented through the regional and national associations.

### Case Study

#### Responsible use of crop protection products

As part of a regional Latin America approach, Bayer CropScience's Agro Vida integrated training campaign in Colombia has reached over 28,000 schoolchildren, 34,000 small growers and agricultural labourers, 600 teachers, 1,700 university students and technicians and 2,200 merchants, as well as people with other vocations. The Agro Vida education campaign focuses on the basic concepts of Integrated Crop Management (ICM), with special attention being given to Integrated Pest Management (IPM) and the responsible handling of chemical crop protection products. The campaigns place particular emphasis on employing the most appropriate methods to convey information to the many beneficiaries that cannot read or write. Visual methods, including stickers, films, posters and theatre performances are amongst a number of tools that have proved very effective as responsible use programmes.

### Case Study

#### Glyphosate Endangered Species Initiative

Monsanto has implemented a stewardship programme called the Glyphosate Endangered Species Initiative. This initiative, operational in the U.S., depends on Monsanto working in partnership with growers and applicators. The programme provides growers with a simple web-based tool (Pre-Serve) to identify areas where threatened or endangered plant species may exist near agriculture. The website prescribes best management practices that growers must implement with certain herbicide-use patterns and application rates in these identified areas to minimise risks to these protected plant species.

### Case Study

#### FMC Agricultural Products Sustainability Council

In June 2010, FMC established an independent "Sustainability Council" with the goal of providing FMC's Agricultural Products Group (APG) with an independent and diverse range of external expertise, perspectives and guidance related to its global stewardship programme and sustainability practices. It is comprised of scientists, a global leader in implementing corporate responsibility and ethics programmes and conservationists.

The objectives of the Sustainability Council include:

- Informing APG of emerging agricultural, environmental, conservation and/or social issues, trends and opportunities related to APG's global business;
- Advising APG on enhancing its global stewardship program and sustainability policies;
- Recommending metrics for assessing APG's global stewardship and sustainability practices;

FMC uses the advice and recommendations received from the Sustainability Council to refine the company's stewardship activities and to devote additional attention and funding to the initiatives that would best achieve the company's stewardship objectives.

#### Associations' Activities

In addition to their individual activities, the companies promote IPM and responsible use through CropLife International and its regional and national associations. These activities have been focused mainly on developing countries, but also more advanced and emerging Organisation for Economic Co-operation and Development (OECD) countries where issues have been identified.

National associations identify the priorities for training in their countries; financial and technical support is provided by CropLife International member companies through CropLife International, and through the

regional associations on the basis of requests from the national associations. This 'bottom-up' approach ensures that real local needs are addressed. In most instances, these activities have been carried out in partnership with other groups (see case studies): typically more than 200 different partners have been involved in the various training programmes carried out each year. The breakdown of these groups for 2008 is shown in figure 6.4. Regular reviews ensure that lessons learnt are incorporated into further training programmes. It also means that the different regions have directed training at a range of different target groups, and used a range of different media (see tables 6.1 and 6.2)

**Table 6.1 Target groups for IPM / Responsible Use training**

|               | Farmers | Farm families | Trainers | Dealers/ Stockists | Medical staff | School/ University | Public | Public workers | Industry employees |
|---------------|---------|---------------|----------|--------------------|---------------|--------------------|--------|----------------|--------------------|
| Africa        | ✓       |               | ✓        | ✓                  |               | ✓                  |        |                | ✓                  |
| Asia          | ✓       | ✓             | ✓        | ✓                  | ✓             | ✓                  |        |                | ✓                  |
| Latin America | ✓       | ✓             | ✓        | ✓                  | ✓             | ✓                  | ✓      | ✓              | ✓                  |

**Table 6.2 Media employed in IPM / Responsible Use training**

|               | Web/ On-line | Radio | TV | Village Broadcast | Cinema | Poster/ Leaflets etc. |
|---------------|--------------|-------|----|-------------------|--------|-----------------------|
| Africa        | ✓            | ✓     |    |                   |        | ✓                     |
| Asia          | ✓            | ✓     | ✓  | ✓                 | ✓      | ✓                     |
| Latin America | ✓            | ✓     | ✓  |                   |        | ✓                     |

Although all national associations promote IPM/Responsible Use training, some are more active than others in running training programmes on a continuous basis. Between 2005 and 2010 training activities were undertaken in 63 of the total 98 countries in South and South-East Asia, Latin America and Africa Middle East where CropLife International has a national association. The split reflects the number of associations in each region. Training is also provided in nine countries in Europe

Additionally, a number of regional Training-of-Trainer programmes were held, for example in Central Asia and for the Mediterranean rim countries. In Europe, the European Crop Protection Association's 'Safe Use Initiative' has supported the initiation of responsible use training in eight countries in southern and eastern Europe.

During the period 2005 to 2010, over 1.3 million individuals (50% from Latin America and 25% each from Asia and Africa/Middle East) have been directly trained by the initiatives supported and implemented by CropLife International and the regional and national associations. Up to 30% of these were female. The yearly number varies between 115,000 and 323,000, the difference depending on the

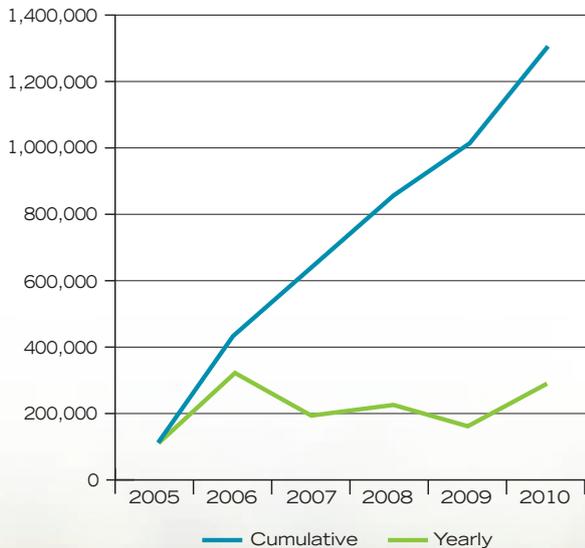
emphasis of the training programmes (Training-of-Trainers or farmers) and the status of partnership projects. The number trained each year is shown in Figure 6.3. Additionally, millions more have been reached through indirect training (subsequent training by graduates of training-of-trainer programmes, farmer-to-farmer training and messaging/training through the media) – in Asia alone it is estimated that 65 million people are reached each year.

In addition to the provision of training, the associations are also active in the development of training materials and responsible use guidelines, which are distributed to the various stakeholders, mainly trainers.

Also within the IPM and Responsible Use elements of the stewardship lifecycle fall the industry's efforts to prevent the development of resistance to their products through the inappropriate or poor management of their use. The member companies of CropLife International, in some cases in collaboration with other groups, have established four resistance action committees (RAC), covering fungicides, herbicides, insecticides and rodenticides (FRAC, HRAC, IRAC and RRAC, respectively). These committees support research into resistance

management, establish programmes to monitor potential resistance development, produce information materials and guidelines for preventing and managing resistance development and promote resistance management options to be considered by regulatory authorities. The RACs have been brought closer to the stewardship activities of CropLife International, with an aim of also incorporating resistance management more effectively with IPM strategies and including resistance management, where appropriate, in farmer and retailer training programmes. Information materials and guidelines produced by the RACs, plus descriptions of their activities, can be found on their dedicated websites, which can be accessed through the CropLife International website at [www.croplife.org](http://www.croplife.org).

**Figure 6.3: Numbers trained each year**



**Figure 6.4: Type of partners in training programmes (2008)**

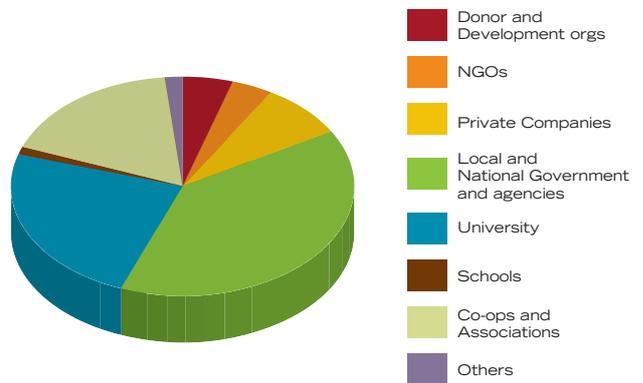
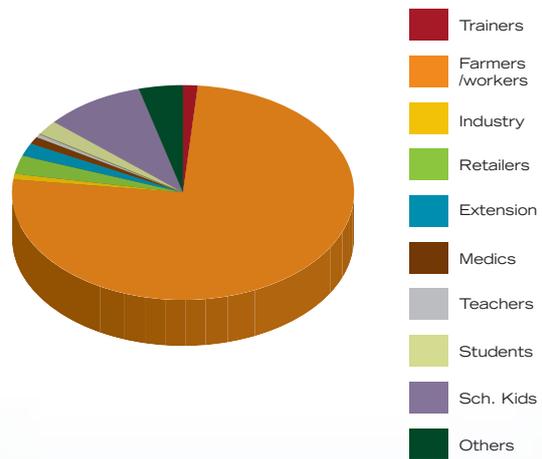


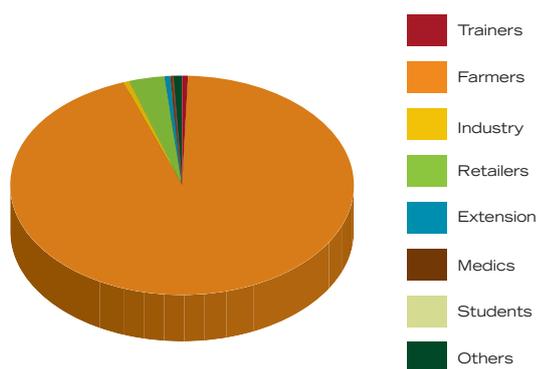
Figure 6.5 breaks down the global figures for trainee occupation

**Figure 6.5: Global breakdown of trainees**

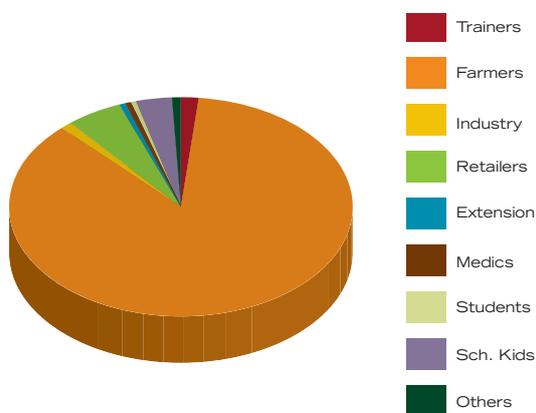


Figures 6.6a, b and c further identify the global breakdown of trainee occupations. This again reflects the priority strategies for the different regions. While all regions train mainly farmers, Latin America also trains a significant number of school children and other groups such as farmer spouses and the general public.

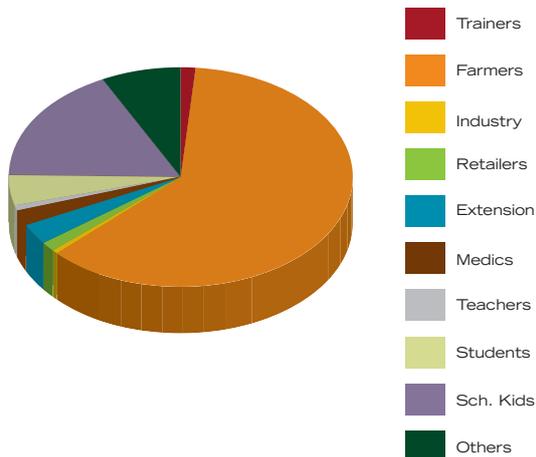
**Figure 6.6a: Africa/Middle East: breakdown of trainees by occupation**



**Figure 6.6b: Latin America: breakdown of trainees by occupation**



**Figure 6.6c: Asia: breakdown of trainees by occupation**



### Case Study

#### IPM and Responsible Use, including Secure Storage of Pesticides, India

Two projects in Andhra Pradesh in India demonstrate two different approaches undertaken by the association. The first project worked, in partnership with the Indian Spices Export Board, with chilli farmers. The project trained farmers in IPM techniques (e.g. pest monitoring using pheromone traps, preservation of natural enemies), including the effective and safe application of chemicals. A major goal was to help farmers achieve quality standards, including keeping pesticides residue levels within limits, which will allow them to access export markets. Some 3,721 farmers were trained and achieved the standards.

The second project aims to train 100,000 farm families in the responsible handling and use of pesticides, including their secure storage. The project, which started in 2010 and will last four years, is implemented through two local NGOs – in which EFFORT undertakes the training and BIRDS undertakes the impact assessments. Farmers and farm families are trained in 15 modules, including IPM, pesticide handling and storage. Schoolchildren are also included in the programme. Initial results show that there is on average a 90% attendance rate for the training. Trainees have shown a greater knowledge of how to decide on the need for pesticide use, how to handle properly and how to dispose of waste. For example, a three-fold increase in the number of farmers washing clothing after spraying and storing them separately (to 66%), a shift from 91% of farmers cleaning nozzles by blowing with their mouth to 100% using pins and water to clear blocked nozzles, an increase in safe storage methods from 20% to 83%.

### Case Study

#### Training of Spray Service Providers and agro-dealers in Zambia

The Spray Service Providers (SSP) Programme is an initiative which aims at promoting the responsible use of pesticides among the small scale farming sector. The initiative was started in 2008 by CropLife Zambia with its partner PROFIT/USAID. The aim of this programme was to identify the small scale users as the most at risk from misuse of pesticides. It was identified that farmers needed information about the IPM, and within this the responsible use of pesticides, how to identify genuine pesticides and how to apply these safely and effectively. CropLife Zambia trained trainers from member companies and the trainers would in turn train selected SSPs – farmers that also provide spraying services to their neighbours – from the various farming groups around the country. During the first phase in 2008-9 a total of 19 trainers from 6 member companies were trained and these individuals further trained over 2,700 SSPs. These SSPs serviced over 4,800 farmers in total.

In 2009 CropLife Zambia signed an MOU with CARE International, a Zambia programme aimed at training approximately 500 pesticide shop stockists (agro-dealers) from 9 districts. The purpose of the training was to provide basic knowledge to the stockists about pesticide management. The trainings included issues such as:

- the roles of the agro-dealer and the farmer;
- environmental Council of Zambia regulations;
- the role of pesticides in IPM;
- classification and formulation of pesticides;
- health and safety issues related to pesticides; understanding the product label;
- use and maintenance of personal protective equipment;
- responsibilities of the store keeper/agent/distributor;
- practical store keeping including the issue and receipt of products, stock records, store hygiene;
- disposal of empty pesticide containers including “triple rinse”;
- and action to be taken in the event of an accident involving pesticides.

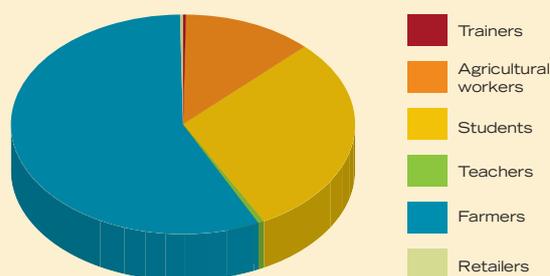
With this knowledge, the stockists would ensure that shops were managed in a responsible manner and they would be able to give advice to the farmers who came to procure pesticides. CARE Zambia are undertaking impact assessments of the programmes, initial results show significant improvements in farmer incomes.

### Case Study

#### IPM training in Nicaragua

The multi-year programme, which started in May 2008, is carried out in the provinces of Jalapa, Condega, Esteli, El Viejo and Chinandega. Its principal aim is to reduce the indexes of labour poisoning among workers of tobacco, vegetables, basic grains, peanut, soy bean and sesame crops. The programme is carried out in collaboration with the Ministry of Health and the Nicaraguan Institute of Agricultural Technology (INTA). A total of 12,747 individuals were trained in 2010.

Occupation of individuals trained



Reinforcement of training was achieved through radio spots and distribution of brochures, posters etc. (10,628 units were distributed). As a result of training, there was a 76% reduction in intoxication amongst agricultural workers in 2010 compared to 2007, and 42% of the target population are now using personal protective equipment (PPE). The rejection of vegetables from the project area in ports of entry into the U.S. in 2010 was zero.

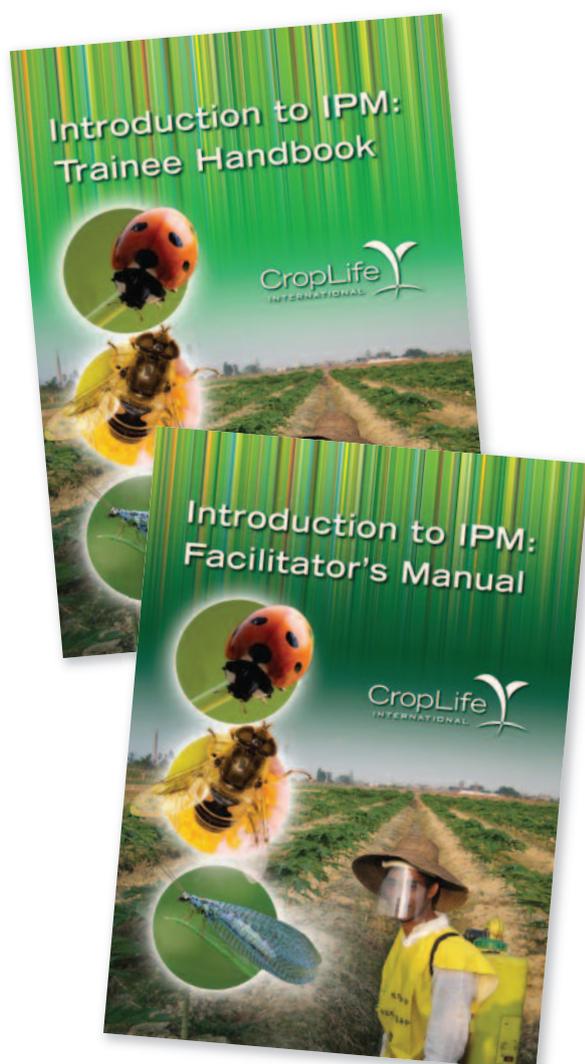
### IPM Training Resources

CropLife International and some of the regional and national associations, have developed information and training material on IPM, which has been widely distributed. For example, more than 10,000 copies of the brochure 'IPM: the way forward for the plant science industry' have been distributed to policy makers, researchers and trainers around the world.

CropLife International developed and published IPM training manuals, both for trainers and participants (first published in 2008 and updated in 2011), integrating the latest knowledge in IPM techniques. CropLife International's training materials, guidelines and information materials are available for use by

CropLife International member associations worldwide, and also freely downloadable on the CropLife International website. The IPM training manual is available in English, Arabic, Chinese, Spanish and French, and the training programme has been rolled out across the network with the training of hundreds of Master Trainers. Regional training material is also available on the CropLife regional association websites. An additional global training resource is a web-based learning tool – [aglearn.net](http://aglearn.net), which has been developed by CropLife Asia. [Aglearn.net](http://aglearn.net) is an Internet-based training tool of courses and includes four IPM courses:

- Introduction to IPM
- Cotton IPM
- Rice IPM
- Vegetable IPM



Courses on responsible use of crop protection products and integrated soil fertility management are also offered. These were originally offered as a facilitated course, but this proved to be too resource intensive and technologically difficult for developing countries, so it was changed to become an unfacilitated course and source of information.

### SUMMARY

The use stage of the crop protection product lifecycle is one of the most important in terms of its potential impact on human health and the environment. For this reason, the plant science industry has placed considerable emphasis on the development of responsible use capacity integrating IPM principles, particularly within the developing world. During the period 2005 to 2010, the industry collectively trained over 1.3 million people in IPM and the responsible use of crop protection products, and several million prior to 2005. Individual companies have also collectively trained millions more. It is estimated that since training programmes began, several hundred million individuals have been reached through training and media. However, impact assessment to date has mainly been based on numbers trained or measuring changes in knowledge. This is being addressed through improved and regular impact assessments, which include measurement of impact in terms of behavioural change. A major effort is now under way to further improve impact assessment.

## Chapter 7: Container Management

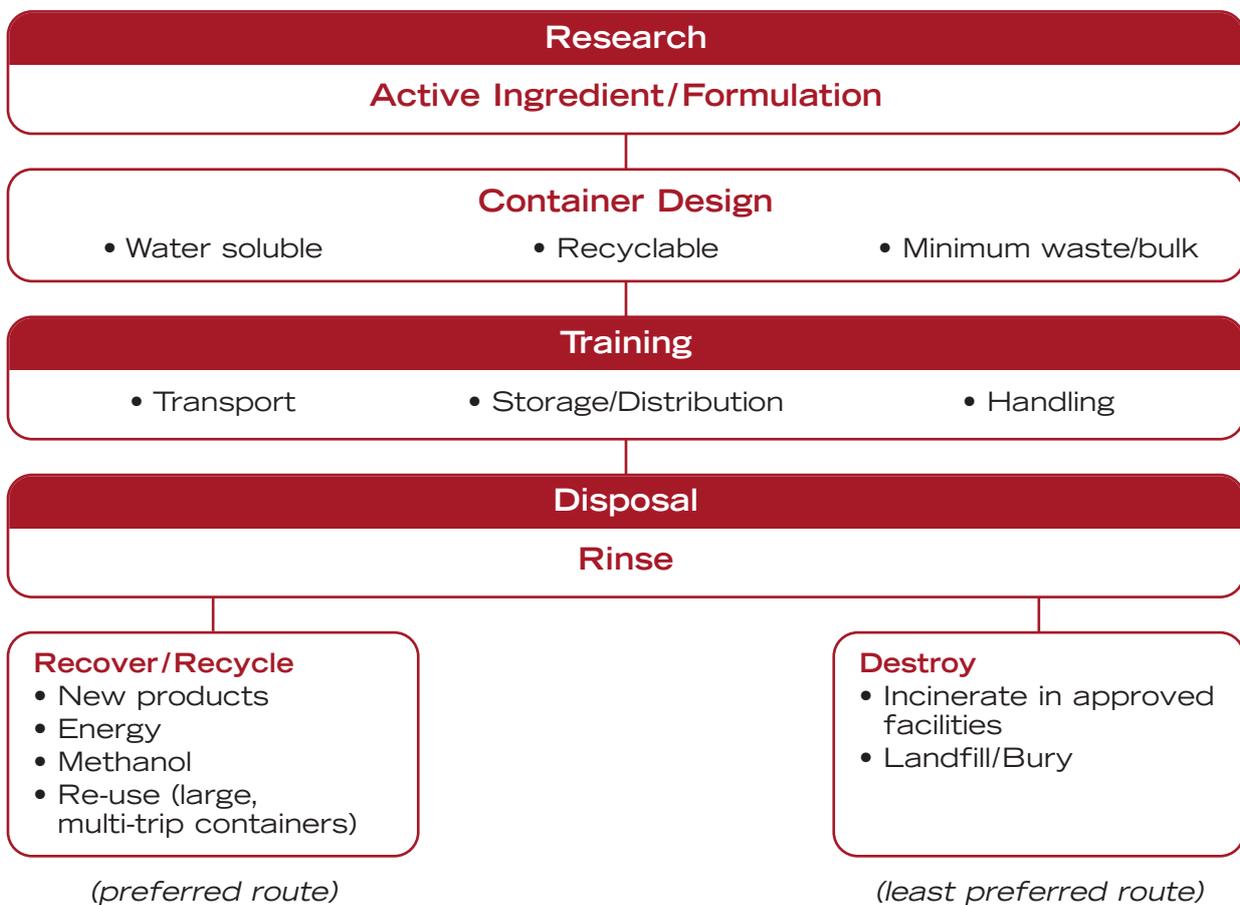
Packaging plays an essential role in ensuring that crop protection products are delivered safely to the intended customers, whilst minimising risks of leakage and exposure. The containers in which products are sold are therefore managed as part of the plant science industry's stewardship lifecycle approach, covering measures to ensure that the containers are treated and disposed of safely and appropriately.

The plant science industry also recognises the need to manage packaging to meet the environmental goals of

reducing waste and to maximise recycling. Several major programmes of container recycling are in operation in a number of countries across the world. These have been developed over several years and are often run in partnership between industry and government.

Container management includes research and design of containers, training of distributors, retailers and end-users and support of recycling options. This is summarised in figure 7.1.

Figure 7.1: Container management options



### Company activities

Container management policies and programmes are supported across three main stages: research and design, training and disposal. The industry's goal is actively to promote the expansion of container management programmes to new regions and countries, based on the lessons learnt and 'best practices' developed in regions where recycling is now the norm.

In areas where recycling is not yet an option, the industry promotes the appropriate disposal of containers as part of its extensive Responsible Use training programmes.

The most successful programmes are typically undertaken in partnership with other stakeholders, such as local authorities and government. However, in the majority of these cases, the initiative for these programmes has come from industry.

The plant science industry is continuing to develop container management programmes across the world with the ultimate aim of recovering all crop protection containers.

The plant science industry is continuing to develop container management programmes across the world with the ultimate aim of recovering all crop protection containers.



### Research & Design

The approach of companies is to prevent packaging waste at its source, while maintaining essential safety. This is why the research and design phase is so crucial to container management. Developments have included:

- Improved water-soluble bags;
- Small ready-to-use packs (suitable size for backpack sprayers);
- Multi-trip, returnable containers – with or without closed transfer systems;
- One-way, single-trip containers made of recyclable material.

Currently, mostly one-way containers are used.

### Training

In addition to research and design, companies and

CropLife associations are also making a significant contribution to container management through the provision of training to growers. This includes guidance on disposal of empty containers, advocating triple or pressure rinsing to remove residues and puncturing or crushing containers to prevent their reuse.

### Recycling

The companies also support a range of different programmes, which are normally supported through the local CropLife association or a separate organisation or company set up to implement a container recycling scheme. These programmes enable the collection and recycling of cleaned plastic containers, which can then be turned into products as diverse as hospital waste incineration bags, fence posts, electrical conduit and irrigation pipes (see table 7.1).

## Case Study

### Inspection of Bulk Containers

In much of the developed world there has been a move toward farmers using returnable bulk containers (containers that hold between 200-1,000 litres of product). These containers are refilled and reused for up to five years. In the U.S. Syngenta supports a programme to ensure the safety of these containers. Every Syngenta bulk product storage site is inspected each year through the Syngenta Annual Bulk Product Stewardship/Safety Inspection Program. The inspections help promote the use and maintenance of proper equipment and parts, reducing potential spill incidents due to equipment failure. The programme protects the customer by evaluating whether tanks and the bulk facility meet applicable state and federal regulations for storage and dispensing of bulk chemicals, and it promotes customer awareness of the need to practise environmental stewardship.

### Associations' activities

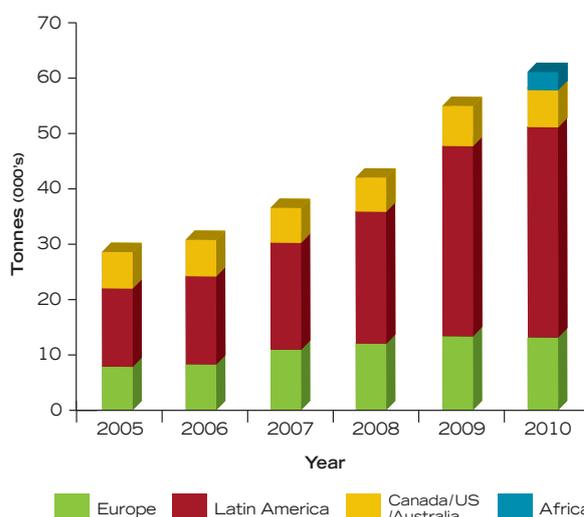
CropLife International and its member associations actively support container management as described above. Globally, the association provides guidance and advice on how to establish a viable scheme, including health, safety and environmental standards, which should be adhered to by all schemes. For example, the association has policies for end-use of recycled plastic that emphasise that the resulting product should be one that is minimally handled. As a result, schemes should have in place clear guidance and contracts with recyclers, which state end-uses. The guidance documents available are shown in Appendix 4.

Container management is an important part of the training provided under the IPM/Responsible Use programmes, where between 100,000 and 300,000 individuals are trained each year. This includes approximately 5,000 distributors and retailers who can inform end users of schemes.

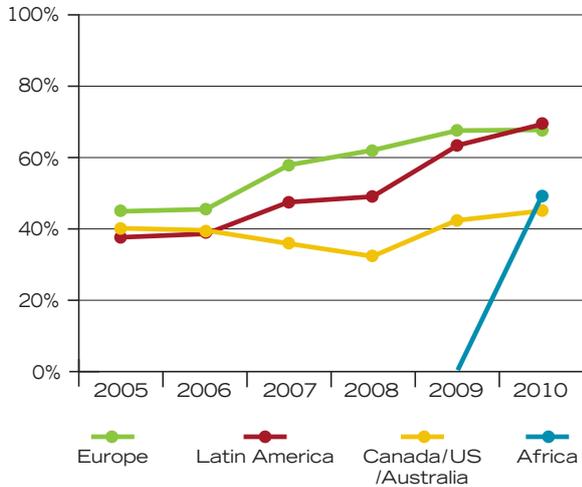
Figure 7.2 shows the amount of plastic containers collected by the various container management programmes supported by CropLife national

associations across the world, as well as the percentage return rate for each scheme and cost of recycling.

**Figure 7.2a: Kilograms of Plastic Containers Collected by Region**

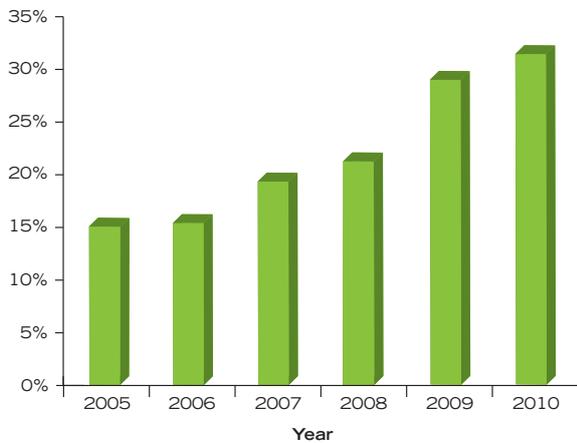


**Figure 7.2b: % Recovered (Regions)**  
 (% of packaging material sent to market; only for countries with Container Management Systems)



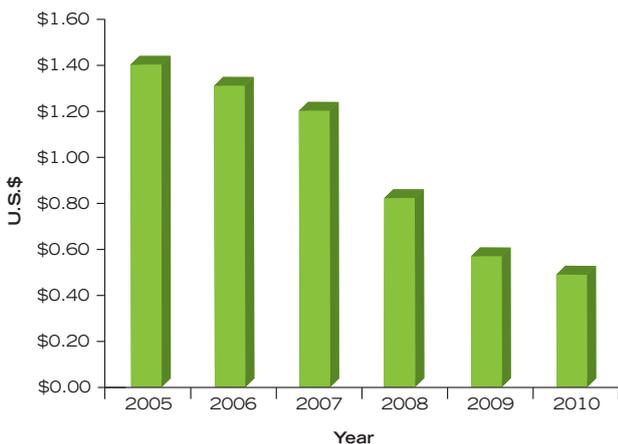
From the figures it can be seen that there has been a continual increase in the total amount of containers recycled, from 2.9 million kg of plastic containers in 2005 to nearly 6 million kg in 2010, and the percentage recycled (based on the estimated amount entering the market). At the same time the cost of recycling (US/kg) has steadily dropped – making the sustainable introduction or continuation of container management programmes more likely. The overall percentage recycling rate for those countries with an established scheme (26 in 2005, 32 in 2010) is 65.13% (excluding Africa and Asia, where programmes are only just being established). If all countries are included that currently do not have a scheme the estimated global recycling rate in 2010 is 32%, compared to 15% in 2005. In addition to the established schemes, 19 pilot schemes are now in operation in Africa, Asia and Eastern Europe.

**Figure 7.2c: % Recovered of total packaging mass over all countries**  
 (packaging sent to market; estimated 190,000 tonnes)



There has also been a shift away from incineration of plastic for energy generation, to recycling into new products. In 2005 all schemes in Europe relied on incineration. Now the larger schemes (France and Germany, in particular) are increasingly recycling into new products. All Latin America schemes recycle into new products. Table 7.1 lists what products are currently being made from recycled pesticide plastic. In addition to plastic, many schemes also recycle metal and paper packaging.

**Figure 7.2d: Cost per kg recovered (global)**  
 (without African CMS)



**Table 7.1: Products made from recycled plastic from pesticide containers**

|  |   |
|--|---|
| Motor oil containers                                 | Plastic crop protection containers                |
| Car battery casing                                   | Pallets   |
| Sewage piping  | Field drain tiles                                 |
| Electricity conductor boxes                          | Speed bumps                                       |
| Waste bags for incineration                          | Parking stops                                     |
| Waste drums  | Construction site maps                            |
| Plastic timber<br>(defined uses that limit exposure) | Commercial truck/manure spreader<br>decker boards |
| Tubing (corrugated)                                  | Agricultural fence posts                          |
| Conduit<br>(buried in walls for electric wires)      | Marine pilings                                    |
| Caps for pesticide bottles                           | Railroad ties                                     |
| Electricity insulators                               | Sound barriers                                    |
| HDPE rope /PET rope                                  | Highway signposts                                 |
| Concrete saver                                       | Nailer boards for concrete forms                  |
|  | Film (non-food uses)                              |

As well as addressing potential environmental, health and safety issues, the recycling of empty pesticide containers has a positive impact on the industry's carbon and environmental footprint. A study undertaken by the Ag Container Recycling Council estimated that since the start of the programme some 45,000 tonnes of plastic containers have been collected and that this resulted in savings of more than 380,000 cubic metres of landfill space,

a reduction of 19,500 tonnes of carbon equivalent and energy savings equivalent to 83,000,000 litres of gasoline. Extrapolated for all 32 container management programmes this would mean that between 2005 and 2010 the total savings of landfill space is 1,900,000 cubic meters, a reduction of 97,500 tonnes carbon equivalent and energy savings equivalent to 415,000,000 litres of gasoline (see also the case studies below).

### Case Study



#### Canada's CleanFARMS Initiative

Canada's CleanFARMS programme has succeeded in collecting and recycling over 87.5 million empty pesticide containers since 1989. This voluntary-led scheme has achieved a return rate of 75% of all pesticide containers. CleanFARMS collects the empty containers at designated return sites, shreds them and transports the materials to various recyclers, where it is manufactured into products such as drainage tile for use on the farm. CleanFARMS Inc. has now been established to operate as an independent company. It aims to expand its programme to include other agricultural plastics, as well as increase the recovery rate for pesticide containers sold into the market, while reducing costs of the programme through efficiencies and selling of recovered plastic for recycling. The overall philosophy, however, is one of safety; thus the programme keeps control of end-use options for the recycled plastic through contractual arrangement and also adheres to strict health, safety and environmental standards. Since 1989 it is estimated that the collection and recycling of the 87.5 million containers is equivalent to saving over 100,000 barrels of oil.

### Case Study



#### Germany's PAMIRA Programme

Germany's PAMIRA programme has been collecting and recycling empty pesticide containers since 1995. Founded by IVA, the German crop protection association, PAMIRA has succeeded in achieving strong collection rates in Germany, with 2,400 tonnes of empty containers collected in 2010. Farmers deposit used containers at one of the approximate 300 collection points once a year, from where they are collected, registered and recycled for their energy or material values, for example, creating plastic casings for underground cables.

### Case Study



#### Brazil's inpEV Programme

Initiated in 2002, Brazil's container management programme, coordinated by the National Institute for Processing Empty Containers (inpEV) is now the largest such programme in the world. The programme has removed more than 180,000 tonnes of empty containers from the environment since 2002, reaching a recycle rate of 98% (31,265 tonnes) for plastic containers in 2010. Additionally, metal and paper packaging is collected. The vast majority of plastic is recycled as new products, including battery casings and, sandwiched between virgin material, new pesticide containers. An eco-efficiency analysis commissioned by inpEV demonstrated that in the six years between 2002 and 2007 (when a total of around 100,000 tonnes of containers had been collected), the proper disposal of containers brought an environmental gain equivalent to 302,000 barrels of oil, which did not need to be extracted or 131,000 tonnes of CO<sub>2</sub> equivalent, which were not emitted into the atmosphere. The programme is actively promoted by inpEV, who also promote recycling generally with a number of other organisations through Dia Nacional do Campo Limpo.

### SUMMARY

The plant science industry and the international, regional and national crop protection associations are heavily involved in addressing the problems and risks associated with the disposal of crop protection containers. This work begins at the research and design phase, with crop protection companies

investing heavily in the development of more environmentally-friendly containers, while maintaining safety and ease of use. To realise their objectives, the companies and associations invest considerably in the training of distributors and growers in container management principles, and the collection and recycling of the containers.

## Chapter 8: Management and Disposal of Obsolete Stocks

**Obsolete crop protection products are those that are unfit for further use or for re-conditioning. Stocks of obsolete pesticides ('obsolete stocks') have accumulated over the last 30 to 40 years and exist in many countries. Poor storage of ageing stocks can lead to leakage, which can cause environmental contamination and health risks. Many of the countries that are affected by obsolete stocks lack the expertise and facilities to safely dispose of such hazardous wastes. CropLife International member companies and associations focus efforts in this area on enabling and ensuring the safe and efficient disposal of these stocks. However, just as important is the proper management of stocks to prevent them from becoming obsolete in the first place. This requires effective measures to avoid overstocking of products, to ensure good storage conditions and, if registrations are withdrawn, to ensure appropriate timelines are allowed for stocks to be used.**

By far the largest obsolete stocks are found in Eastern Europe, the former Soviet Union, Africa, South America and Asia. In these regions, the stocks are generally located in large stores and owned by governmental or semi-governmental organisations. One estimate has suggested that as much as 300,000 tonnes of obsolete materials may be present in these regions. This situation is due to a number of reasons, principally:

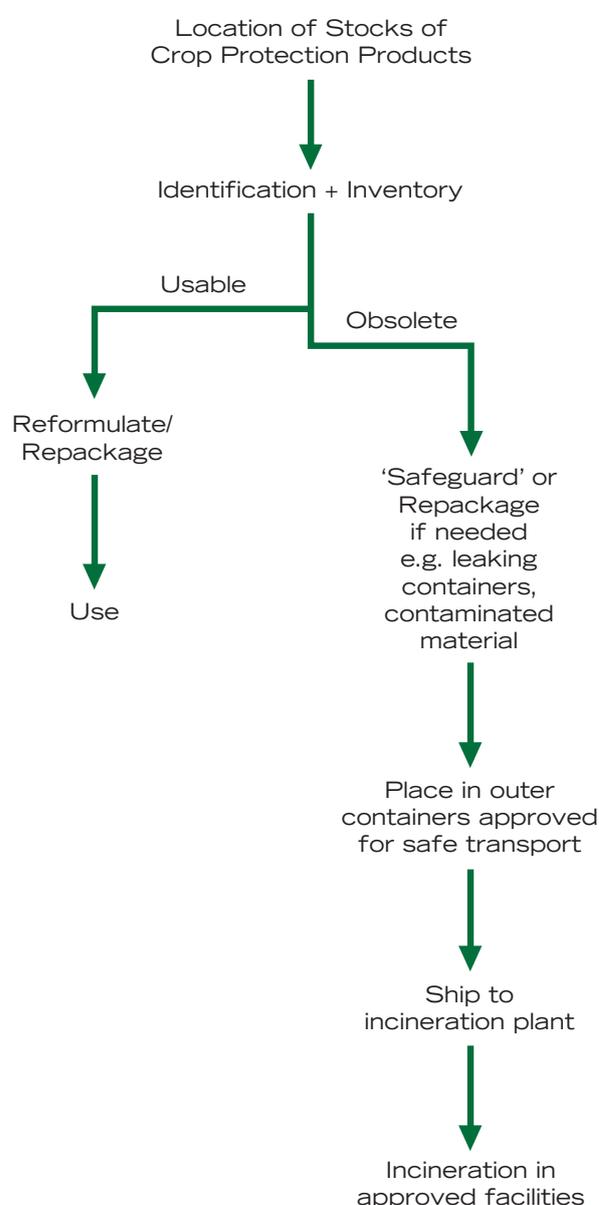
- Poor infrastructure and the resulting failure of centralised purchasing systems to deliver crop protection products to farmers in appropriate packs and/or on time;
- Poor management of stocks, whether donated as development aid or purchased by governments, acquired for the control of strategic pests (locusts, army worms, malarial mosquitoes and other insect vectors of disease);
- Lack of awareness of the issue amongst national authorities and a lack of local expertise, capacity and resources to dispose of obsolete stocks safely and effectively;
- Over-production by local manufacturers in 'planned economies';
- Products being deregistered locally or banned internationally.

In Western Europe, North America, Australia/New Zealand and Japan the amount of obsolete material is much smaller and is generally in the form of farmer-held stocks resulting from deregistration or over-purchase. Of course, some farmer-held stocks are also held in the regions mentioned above.

In some cases these stocks originate from CropLife International member companies. Others, depending on the region, were originally supplied by local manufacturers.

Obsolete stocks can be disposed of efficiently and safely if skilled resources are brought together (figure 8.1). These resources need to come from a variety of stakeholders, including the plant science industry, which have the skills and resources for identifying, testing and handling chemicals; governments that often own the chemicals, hazardous waste disposal companies that can safely dispose of the products; aid agencies that have access to skills and financial resources and NGOs that can assist in locating obsolete stocks and in their disposal. Dealing with obsolete stocks is a multi-stakeholder responsibility.

**Figure 8.1 Stages in removal of obsolete stocks**



However, disposal of obsolete stocks is only part of the necessary stewardship effort. In fact, it can be legitimately argued that the presence of obsolete stocks has resulted when effective stewardship has

not been practised by one or more groups of stakeholders. Stewardship should aim to prevent the build-up of obsolete stocks. This can be achieved by:

- The implementation of tender guidelines to help governments and other stakeholders to tender for the right product, amount and quality;
- The provision of better warehousing;
- The training in management of crop protection products and their stocks;
- The regulation of the trade in illegal, counterfeit and sub-standard crop protection products.

### Industry activities

The industry has been actively involved for the last 20 years in projects to remove obsolete stocks. Additionally, management practices and training have been introduced to help prevent future build-up.

As in most cases obsolete stocks include products from various companies, the majority of disposal projects have been coordinated by the association under a policy adopted in 1995 (see below). However, there have been some disposal projects undertaken by individual companies (see case studies).

### CropLife International's obsolete stocks policy:

- Member companies will provide assistance for disposal of stocks that they originally manufactured or supplied.
- The level of assistance is an individual company decision decided on a case-by-case basis after verification of the stocks and their origin. Such contributions are given on the basis of goodwill and a desire to see the elimination of potentially hazardous waste from the environment.
- The future prevention of obsolete stocks is a major concern of CropLife International, requiring the participation of all stakeholders in the supply and use of crop protection products.

### Case Study

#### Disposal of obsolete pesticides from Sri Lanka

In 2009, Bayer CropScience, in partnership with its local partner Hayleys and supported by the Central Environment Authority, initiated a project to remove 241 drums of obsolete chemicals, which had accumulated over 30 years at a former premises of the company in Sri Lanka. Most of the chemicals were highly toxic. The chemicals were properly identified, repacked safely and shipped to Germany, where they were incinerated in an approved (UN standard) hazard waste incinerator. In all, 7.2 tonnes of chemicals and waste were incinerated.

Companies are also involved in the prevention of future build-up of obsolete stocks. Optimum stock and product management is a commercial necessity for companies and forms an important part of their business strategies.

The industry associations coordinate the majority of obsolete stocks disposal projects. Since 1991, CropLife International has been working in a variety of countries to facilitate disposal projects. Facilitation has variously involved organising projects, supervising operations in the field or, where appropriate, re-formulating useable stocks. The association collaboration on obsolete stocks disposal is not limited to CropLife International's member companies and expert team. Support has included significant inputs from some companies that are not part of the CropLife

International network, but wish to work with it to deal with the obsolete stocks issue. During this period the following has been achieved:

- Facilitation of over 30 disposal projects;
- Contribution to the safe disposal of over 4,000 tonnes of obsolete products from developing countries, especially in Africa;
- Promotion of initiatives in developed countries, where over 5,000 tonnes of obsolete stocks have been collected from farmers.

Examples are presented in figures 8.2, 8.3 and 8.4

The industry is also actively supporting new initiatives to deal with obsolete stocks. A major commitment is the Africa Stockpiles Programme (ASP), a multi-

stakeholder partnership between the World Bank and the Global Environment Facility, FAO, African Union, WWF, Pesticide Action Network, CropLife International and local stakeholders. The ASP is being implemented in a phased approach over 10-15 years to:

- Dispose of an estimated 50,000 tonnes of obsolete stocks and contaminated waste in Africa in an environmentally sound manner – effectively removing all obsolete stocks from Africa;
- Catalyse the development of prevention measures;
- Provide capacity-building and institutional strengthening on important chemical-related issues.

CropLife International's support consists of contributing to the collection and incineration of stocks, the amount of contribution being related to the amount of product that was originally supplied by member companies – estimated to be one third of the total tonnage of product – and provision of expertise on identification, handling, safeguarding and disposing of chemicals. Currently projects are in operation in seven countries – Ethiopia, Eritrea, Mali, Morocco, Tanzania and Tunisia, which will result in up to 4,500 tonnes being removed and destroyed. In Ethiopia, Mozambique and South Africa some 1,600 tonnes have already been destroyed. These projects are led by the World Bank or FAO, with financial and expert input from CropLife International. Additionally, CropLife International have developed 'safeguarding' projects in four countries: Cameroon, Ghana, Kenya and Malawi, in which obsolete stocks held by the private sector (e.g. farmers) are being identified and those that present a significant risk are collected and, if needed, re-packaged, ready for eventual disposal (see case study on Safeguarding Projects in Africa). In Nigeria, CropLife International is helping to

safeguard some of the stocks identified in a World Bank led project that inventoried obsolete stocks in the country.

Other activities include discussions and advice on how to approach and deal with the obsolete stocks issue in Eastern Europe, where the vast majority of products do not originate from member companies, but CropLife International's expertise is likely to be needed.

The federation is also actively engaged in the prevention of future build-up of obsolete stocks, at both a government/dealer warehouse level and farmer level, through training programmes on proper handling and management of crop protection products. This training is undertaken as part of our 'Responsible Use' and 'Warehousing' stewardship activities (see earlier chapters).

The impact and success of the industry's obsolete stock programmes therefore include two measures: (1) the amount of current obsolete stocks that are removed; and (2) demonstration that no further obsolete stocks are being accumulated thanks to proper purchasing policies, stock management and training/capacity building being put into place.

## SUMMARY

CropLife International's member companies and associations have recognised the historical problem of obsolete stocks and are actively involved in working with others to help dispose of these safely and effectively. The companies have put into place management practices to prevent future build-up of stocks, and are engaged in training with other stakeholders on prevention.

## Case Study

### Safeguarding Projects in Africa

As part of its contribution to the African Stockpiles Programme (ASP – see above), CropLife International has been leading Safeguarding projects in Cameroon, Ghana, Kenya and Malawi. These programmes recognise that there are significant obsolete pesticide stocks held by the private sector that have not been addressed by the ASP. Working closely with the governments of each country, the projects have developed a system – branded under CleanFARMS: Obsolete Stocks Collection – for private holders of obsolete stocks to declare them through a website ('booking'). The CleanFARMS project staff then collects the stocks. Stocks that are at high risk (e.g. leaking) are repacked by hazardous waste contractors and all collected stocks and associated waste – the latter mainly consisting of empty pesticide containers – are then stored in secure warehouses awaiting disposal under the ASP or associated programmes. Currently, 220, 160, 200 and 450 tonnes of obsolete stocks and associated waste have been identified in Cameroon, Ghana, Kenya and Malawi respectively and all will be safeguarded by April 2012.

Figure 8.2: Association disposal projects in Africa

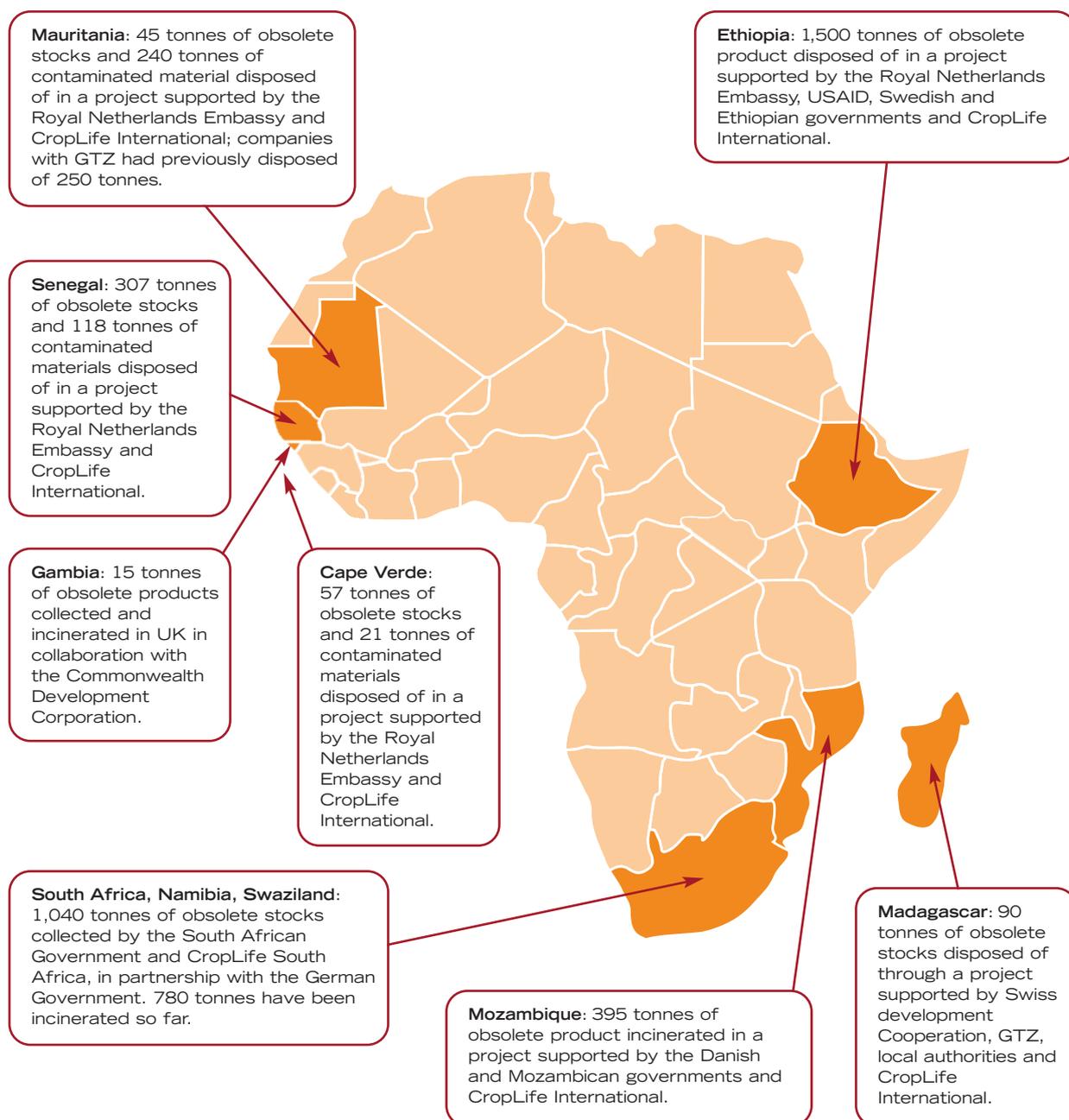


Figure 8.3: Association disposal projects in Asia

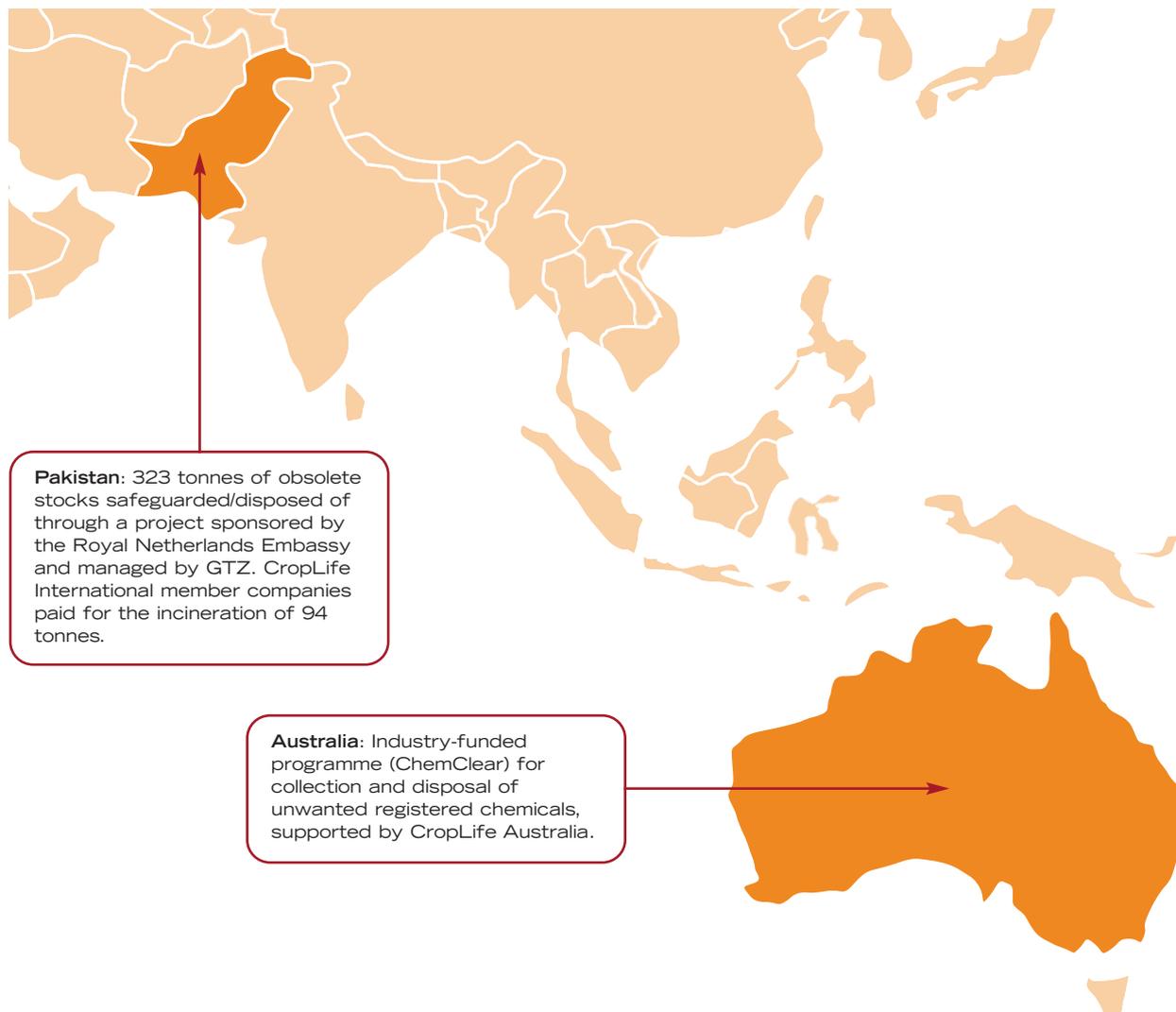


Figure 8.4: Association disposal projects in North and South America



## Chapter 9: Implementation of the International Code of Conduct on the Distribution and Use of Pesticides

The International Code of Conduct on the Distribution and Use of Pesticides is the worldwide guidance document on pesticide management for all public and private entities engaged in, or associated with, the distribution and use of pesticides. It was developed by Food and Agriculture Organization of the United Nations (FAO), in cooperation with other international organisations, NGOs and the plant science industry. The Code was first adopted in 1985. A revised version was adopted by the FAO Council in November 2002, which took into account the adoption of the Rotterdam Convention on the Prior Informed Consent procedure (PIC), and continuing challenges in the management of pesticides in developing countries. The Code is now also supported by the World Health Organization (WHO).

The Code is designed to provide voluntary standards of conduct and to serve as a point of reference in relation to sound pesticide management practices, in particular for government authorities and the pesticide industry, but also users of pesticides, international organisations and NGOs. It focuses on risk reduction, protection of human health and the environment, and support for sustainable agricultural development by using pesticides in an effective manner and applying IPM strategies.

Although the Code is designed for use within the context of national legislation, it is particularly aimed at countries where there is inadequate or no national legislation to regulate pesticides effectively. It recognises that training at all levels is an essential element to implementation.

The standards promoted by the Code:

- encourage responsible and generally accepted trade practices;
- assist countries which have not yet established regulatory controls on the quality and suitability of pesticide products needed in that country to promote the judicious and efficient use of such products and address the potential risks associated with their use;
- promote practices which reduce risks in the handling of pesticides, including minimising adverse effects on humans and the environment and preventing accidental poisoning resulting from improper handling;
- ensure that pesticides are used effectively and efficiently for the improvement of agricultural production and of human, animal and plant health;

- adopt the "lifecycle" (or stewardship) concept to address all major aspects related to the development, regulation, production, management, packaging, labeling, distribution, handling, application, use and control, including post registration activities and disposal of all types of pesticides, including used pesticide containers;
- are designed to promote integrated pest management (IPM) (including integrated vector management for public health pests);
- promote information exchange between stakeholders.

CropLife International, its association networks and member companies support the implementation of the Code, and adherence to it is a condition of membership of CropLife International. The Code provides responsibility to different sectors for implementation, including industry. In response to this, and to aid implementation, CropLife International has produced a guide for industry on implementation that highlights the articles in the Code relevant to the industry. Additionally, articles of the Code can be broadly assigned to stewardship, regulatory or other activities.

CropLife International has made it a policy to promote understanding of the Code throughout its network of member associations and companies. In order to achieve this, an eLearning course has been developed consisting of four modules, including self-assessments targeted to specific audiences:

|                 |   |
|-----------------|---|
| <b>Module 1</b> | General Overview                              |
| <b>Module 2</b> | Marketing, Distribution and Sales             |
| <b>Module 3</b> | Production, Formulation and Packaging         |
| <b>Module 4</b> | Registration, Training and Technical Services |

The modules have been aimed at different parts of the workforce – allowing individuals to undertake a module that deals with their area of work, or for individuals to undertake all modules to get an oversight of the entire code. The modules are available in Arabic, Chinese, English, French, German, Japanese, Polish, Portuguese, Russian and Spanish on CDs. The English, Spanish and French version is available on the CropLife International website ([http://www.croplife.org/e\\_learning\\_tool](http://www.croplife.org/e_learning_tool)). CropLife International member companies have also placed the modules on their internal training platforms.

CropLife International's member companies set goals to train all relevant people, globally, within their companies to understand their responsibilities under the Code. This has been achieved, partly through use of the eLearning tool. CropLife national associations have also been introduced to the Code through presentations at regional association meetings and distribution of the eLearning CDs; to date several hundred CDs have been distributed to interested parties including governmental institutions.

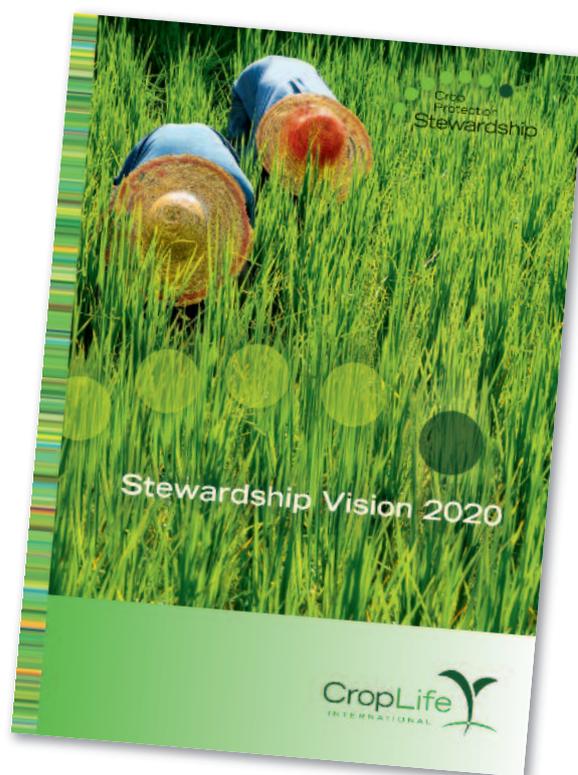
During 2011 there has also been outreach to individuals that are not employed by CropLife International's member companies and network of associations, including pesticide retailers. The main route for access to the eLearning for these groups is the versions on the regional websites. From the website statistics the number of people accessing and completing the course can be determined. For Asia, 565 people signed in (470 to the English version and 95 to the Chinese). For Latin America 2,102 people

have signed in since the course was placed on-line (in 2009) and 373 have graduated (a participant is counted as passing the course if they answer 70% of the self-assessment questions correctly).

Additionally, CropLife International has actively participated in the Joint Meeting on Pesticide Management (JMPM), convened by the FAO, which consists of pesticide management experts from several developed and developing countries, as well as FAO, WHO and UNEP. CropLife International, along with NGOs, Pesticide Action Network, and the association representing generic pesticide producers, Agro Care, are observers to the meeting. The JMPM is tasked with developing guidelines that support the Code, e.g. Container Management Guidelines, Guidelines for Personal Protection in Hot Climates (jointly developed with CropLife International). CropLife International has provided comment and expert input into all guidelines currently approved on the FAO website at [www.fao.org](http://www.fao.org).

## Chapter 10: Concluding Summary Points

1. CropLife International's member associations and companies undertake stewardship activities across the world; this reflects the industry's commitment to responsible business and support for International Code of Conduct on the Distribution and Use of Pesticides.
2. Activities are undertaken across the whole stewardship cycle, which consists of seven elements. These elements are, however, closely interrelated, e.g. research produces new products that can be used in IPM strategies and new formulations that are safer; dealer training results in good stock management and no further build-up of obsolete stocks; advances in formulation and packaging result in longer shelf-life leading to less chance of obsolescence; etc.
3. Stewardship methods are adapted to each phase of the cycle and often conducted in partnerships. There is greater control by the industry at the research/manufacturing end of the 'cycle' (the rest is also covered by regulations). Control becomes difficult or complex, involving more stakeholders, further down the cycle.
4. Stewardship is not the sole responsibility of industry, and extends beyond where industry has control (e.g. beyond the dealer). Industry has embraced this challenge through working with partners.
5. The actual activities in each country are dependent on identified needs.
6. The stewardship challenges are greater in developing countries and where one moves 'down' the cycle to the field and beyond.
7. Stewardship activities are not limited to large markets, but are also promoted in countries where markets are small.
8. Partnerships with a variety of stakeholders are in operation – this increases impact and outreach.
9. There is a need to develop clear and transparent strategies and goals for all stewardship activities and communicate them in an appropriate manner – this is summarised in CropLife International's Stewardship Vision 2020.



## Appendix 1: The Plant Science Industry's Statement on Sustainable Development

CropLife International, the global federation representing the plant science industry, and its member companies are committed to sustainable development. Sustainable Development requires a major contribution from agriculture to satisfy food and fibre needs, to maintain and enhance the economic viability of farms and the rural community and to protect and enhance the environment.

The plant science industry's competencies lie in developing and supplying agricultural technologies, services and solutions focussed on enhancing crop productivity, optimising natural resource use and reducing crop losses from pests, diseases and weeds. These technologies include agrochemicals, traditionally bred seeds and those bred through modern plant biotechnologies.

All the technologies provided by the plant science industry play an important role in meeting global needs with respect to securing and increasing food and fibre production, farmers' livelihood improvement and environmental protection including water, soil or wild biodiversity.

In order to continuously improve economic, environmental and social performance, CropLife International is committed to further develop and measure progress in its current lifecycle stewardship activities that include:

- Researching and developing innovative technologies and solutions, adapted to local conditions that present farmers with a variety of choices to improve yields and crop health while respecting the environment.
- Continuously improving manufacturing, packaging and delivery systems to decrease waste, water use and emissions.
- Training and education of the farming community in integrated pest management, including the responsible handling, storage and use of crop protection products and biotechnology products.
- Implementing and promoting country specific environmentally sound container management systems.
- Cooperating in multi-stakeholder programmes to dispose of obsolete pesticides and to prevent future build up.
- Playing a constructive role in initiatives and programmes, including public-private partnerships, aimed at improving agricultural resilience and sustainability.
- Providing constructive input to the establishment and implementation of effective, science-based regulatory systems and international conventions.

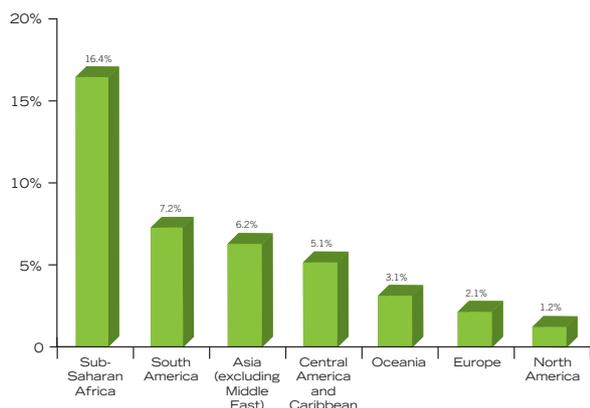
Since its inception in 1986, the FAO Code of Conduct on the distribution and use of pesticides has been made a condition of CropLife International membership. Member companies of CropLife International also adhere to the Responsible Care® scheme of the chemical industry.

## Appendix 2: Global Agriculture: Key Statistics

Agriculture is a major economic activity in many countries (figure A1.1); this is especially true for a developing country for which the percentage contribution that agriculture makes to GDP is 10.2% on average, compared to 1.7% in developed countries. In the poorest income countries the figure is considerably higher at 20.1%, and in sub-Saharan Africa, agriculture can account for up to 60% of GDP in some countries. Indeed, some 70% of the world's poor are located in rural areas, where agriculture is the primary source of income. It is also in the developing countries of the world that the vast majority of the world's farmers are located who need to maintain their livelihoods farming on holdings often less than one hectare (figures A1.2 and A1.3)

Agriculture is therefore key to individual livelihoods, poverty alleviation and economic growth, across the world.

**Figure A1.1: 2001 – GDP: Percentage from Agriculture**

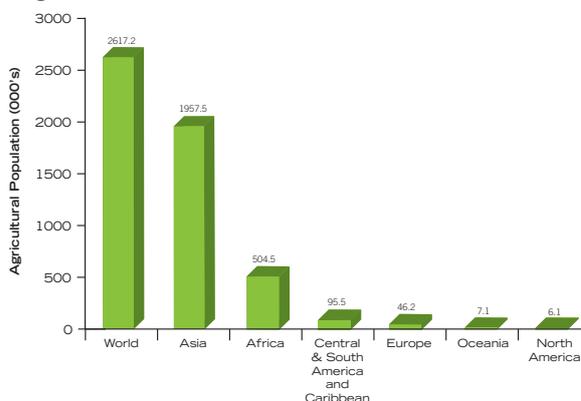


Source: FAO

As a result, the key challenge in agriculture over the last few decades has been to ensure that agricultural production keeps pace with a growing population. In addition to this and sometimes seemingly at odds with it, has been the increasing recognition of the need to protect and preserve biodiversity and the environment.

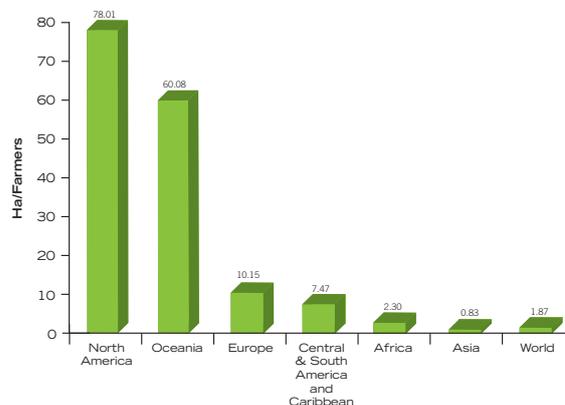
It is the use of new technologies – improved plant varieties, crop protection products, cultivation and water management techniques and inputs – combined with traditional knowledge within an integrated crop management strategy that has resulted in significant increases in crop productivity (figure A1.4). As a result of this increased productivity, overall production of food and fibre has been able to keep pace with population growth, without the need continually to bring more land into agricultural use.

**Figure A1.2: Agricultural Population (1,000,000) per Region – 2008**



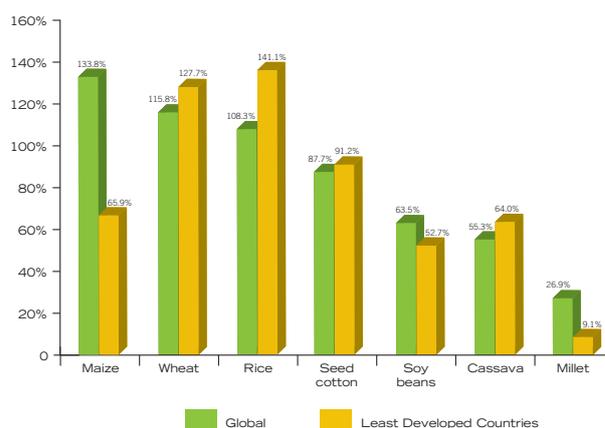
Source: FAO

**Figure A1.3: Average agricultural land holdings – 2008**



Source: FAO

**Figure A1.4: Increase of crop yields (1966 to 2009) – kg/ha**



Source: FAO

## Appendix 3: FAO International Code of Conduct on the Distribution and Use of Pesticides

The International Code of Conduct on the Distribution and Use of Pesticides is the worldwide guidance document on pesticide management for all public and private entities engaged in, or associated with, the distribution and use of pesticides. It was developed by Food and Agriculture Organization of the United Nations (FAO), in cooperation with other international organisations, NGOs and the plant science industry. The Code was first adopted in 1985. A revised version was adopted by the FAO Council in November 2002, which took into account the adoption of the Rotterdam Convention on the Prior Informed Consent procedure, and continuing challenges in the management of pesticides in developing countries.

The Code is designed to provide voluntary standards of conduct and to serve as a point of reference in relation to sound pesticide management practices, in particular for government authorities and the pesticide industry, but also users of pesticides, international organisations and NGOs. It focuses on risk reduction, protection of human health and the environment, and support for sustainable agricultural development by using pesticides in an effective manner and applying IPM strategies.

Although the Code is designed for use within the context of national legislation, it is particularly aimed at countries where there is inadequate or no national legislation to regulate pesticides effectively. It recognises that training at all levels is an essential element to implementation.

The standards promoted by the Code:

- Encourage responsible and generally accepted trade practices
- Assist countries which have not yet established regulatory controls on the quality and suitability of pesticide products needed in that country, to promote the judicious and efficient use of such products and address the potential risks associated with their use

- Promote practices which reduce risks in the handling of pesticides, including minimising adverse effects on humans and the environment and preventing accidental poisoning resulting from improper handling
- Ensure that pesticides are used effectively and efficiently for the improvement of agricultural production and of human, animal and plant health
- Adopt the "lifecycle" (or stewardship) concept to address all major aspects related to the development, regulation, production, management, packaging, labelling, distribution, handling, application, use and control, including post registration activities and disposal of all types of pesticides, including used pesticide containers
- Are designed to promote integrated pest management (IPM) (including integrated vector management for public health pests)
- Promote information exchange between stakeholders.

CropLife International, its member associations and leading companies support implementation of the Code, and adherence to it is a condition of membership of CropLife. The Code provides responsibility to different sectors for implementation, including industry. In response to this, and to aid implementation, CropLife International has produced a guide for industry on implementation, that highlights the articles in the Code relevant to the industry. Additionally, articles of the Code can be broadly assigned to stewardship, regulatory or other activities. Table 3.1 summarises the Code articles directly relevant to industry, and to what areas of stewardship, or regulation they refer. It illustrates that the industry's activities in stewardship underpin its commitment to the Code.

**Table 3.1: Summary of FAO Code Articles Relevant to Industry**

| FAO Code Articles Relevant to Industry  | Stewardship Elements |             |                     |     |          |                      |                 |                     | Regulatory and Technical Elements |                           |              |          |
|---|----------------------|-------------|---------------------|-----|----------|----------------------|-----------------|---------------------|-----------------------------------|---------------------------|--------------|----------|
|   | R&D                  | Manufacture | Storage & Transport | IPM | Safe Use | Container Management | Obsolete Stocks | Stewardship General | Technical Specifications          | Technical Recommendations | Registration | Residues |
| <b>1 Code Objectives</b>  |                      |             |                     |     |          |                      |                 |                     |                                   |                           |              |          |
| 1.6 Training activities related to the Code are given a high priority   |                      |             | •                   | •   | •        | •                    | •               |                     |                                   |                           |              |          |
| <b>2 Definitions</b>  |                      |             |                     |     |          |                      |                 | •                   |                                   |                           |              |          |
| <b>3 Pesticide Management</b>   |                      |             |                     |     |          |                      |                 |                     |                                   |                           |              |          |
| 3.2 The Code should be adhered to as a standard for the manufacture, distribution and advertising of pesticides   |                      | •           | •                   |     |          |                      |                 |                     |                                   |                           |              |          |
| 3.4.1 Only pesticides of adequate quality are supplied, and are packaged and labelled as appropriate for each specific market   |                      | •           |                     |     |          |                      |                 |                     | •                                 |                           |              |          |
| 3.4.2 Provisions of FAO guidelines on tender procedures are adhered to, in close cooperation with procurers of pesticides   |                      |             | •                   |     |          |                      |                 |                     |                                   |                           |              |          |
| 3.4.3 Risks to users and adverse effects to the environment are reduced by the choice of pesticide formulations and the presentation, packaging and labelling   |                      |             |                     | •   | •        |                      |                 |                     |                                   |                           |              |          |
| 3.4.4 Each pesticide package provides information and instructions in a form and language to ensure effective use and reduce risks during handling  |                      |             |                     |     | •        |                      |                 |                     |                                   |                           |              |          |
| 3.4.5 Effective technical support is provided, including advice on disposal of pesticides and used pesticide containers   |                      |             |                     |     | •        | •                    |                 |                     |                                   |                           |              |          |
| 3.4.6 Their products are followed to the end-user, and occurrence of any problems arising from the use of their products is recorded  |                      |             |                     |     |          |                      |                 | •                   |                                   |                           |              |          |
| 3.5 The use of pesticides is avoided if they require personal protective equipment which is uncomfortable, expensive or not readily available   |                      |             |                     |     | •        |                      |                 |                     |                                   |                           |              |          |
| 3.6 Educational materials are disseminated to pesticide users, farmers, farmers' organisations, agricultural workers, unions and other interested parties   |                      |             |                     |     | •        |                      |                 |                     |                                   |                           |              |          |
| 3.7 IPM is proactively developed and promoted   |                      |             |                     | •   |          |                      |                 |                     |                                   |                           |              |          |
| 3.8   |                      |             |                     |     |          |                      |                 |                     |                                   |                           |              |          |
| 3.11 Resistance management strategies are developed and promoted in order to prolong the useful life of valuable pesticides and to reduce the development of resistance of pests to pesticides                  |                      |             |                     | •   |          |                      |                 |                     |                                   |                           |              |          |
| <b>4 Testing of Pesticides</b>  |                      |             |                     |     |          |                      |                 |                     |                                   |                           |              |          |
| 4.1.1 Each pesticide is adequately and effectively tested fully to evaluate efficacy, behaviour, fate, hazard and risk under anticipated conditions of use  | •                    |             |                     |     |          |                      |                 |                     | •                                 |                           | •            |          |
| 4.1.2 Tests are conducted in accordance with sound scientific procedures and the principles of good laboratory practice   | •                    |             |                     |     |          |                      |                 |                     | •                                 |                           | •            |          |
| 4.1.3 Copies or summaries of original reports of tests are made available for assessment by responsible government authorities in the countries where the product is to be sold                                 | •                    |             |                     |     |          |                      |                 |                     | •                                 |                           | •            |          |
| 4.1.4 Proposed use pattern, label claims and directions, packages, technical literature and advertising reflect the outcome of the scientific tests and assessments   |                      |             |                     |     |          |                      |                 |                     |                                   | •                         |              |          |
| 4.1.5 Methods of analysis and necessary analytical standards are provided to governments at their request   | •                    |             |                     |     |          |                      |                 |                     |                                   |                           | •            |          |
| 4.1.6 Advice and training assistance is provided to technical staff involved in relevant analytical work  |                      |             |                     |     |          |                      |                 |                     | •                                 |                           | •            |          |
| 4.1.7 Residue trials are conducted prior to marketing, in order to establish appropriate maximum residue limits   |                      |             |                     |     |          |                      |                 |                     |                                   | •                         |              | •        |
| 4.5 Post-registration surveillance or monitoring studies are conducted in collaboration with governments to determine the fate of pesticides and their health and environmental effects under field conditions. |                      |             |                     |     | •        |                      |                 |                     |                                   |                           | •            |          |
| <b>5 Reducing Health and Environment Risks</b>  |                      |             |                     |     |          |                      |                 |                     |                                   |                           |              |          |
| 5.1.8 Segregate pesticides from other materials during storage  |                      |             | •                   |     | •        |                      |                 |                     |                                   |                           |              |          |
| 5.2.1 Appropriate information is provided for the periodic reassessment of pesticides   |                      |             |                     |     |          |                      |                 |                     |                                   | •                         |              |          |
| 5.2.2 Poison control centres and medical personnel are provided with information on pesticide hazards and suitable treatment of pesticide poisoning   |                      |             |                     |     | •        |                      |                 |                     |                                   |                           |              |          |
| 5.2.3.1 Less toxic formulations are made available  | •                    |             |                     |     |          |                      |                 |                     |                                   |                           | •            |          |
| 5.2.3.2 Ready-to-use packages are used whenever possible  |                      |             |                     |     | •        | •                    |                 |                     |                                   |                           |              |          |
| 5.2.3.3 Containers attractive for re-use are not used and programmes to discourage re-use are promoted where container collection systems are in place  |                      |             |                     |     |          | •                    |                 |                     |                                   |                           |              |          |
| 5.2.3.4 Returnable and refillable containers are used where container collection systems are in place   |                      |             |                     |     |          | •                    |                 |                     |                                   |                           |              |          |
| 5.2.3.7 Clear and concise labelling is used   |                      |             |                     |     | •        |                      |                 |                     |                                   |                           | •            |          |
| 5.2.4 Sale of products is halted and products are recalled when handling or use pose an unacceptable risk under any use directions or restrictions  |                      |             |                     |     | •        |                      |                 |                     |                                   |                           |              |          |
| 5.3.1 The use of proper and affordable personal protective equipment is promoted, in cooperation with governments   |                      |             |                     |     | •        |                      |                 |                     |                                   |                           |              |          |

| FAO Code Articles Relevant to Industry  | Stewardship Elements |             |                     |     |          |                      |                 |                     | Regulatory and Technical Elements |                           |              |          |
|---|----------------------|-------------|---------------------|-----|----------|----------------------|-----------------|---------------------|-----------------------------------|---------------------------|--------------|----------|
|   | R&D                  | Manufacture | Storage & Transport | IPM | Safe Use | Container Management | Obsolete Stocks | Stewardship General | Technical Specifications          | Technical Recommendations | Registration | Residues |
| 5.3.3 Services to collect and safely dispose of used containers are established, in cooperation with governments  |                      |             |                     |     |          | •                    |                 |                     |                                   |                           |              |          |
| 5.3.4 Protect/minimise effects on biodiversity  | •                    |             |                     | •   | •        | •                    | •               |                     |                                   |                           |              |          |
| 5.5.1 Engineering standards and operating practices for production facilities in developing countries are of a suitable standard for the nature of the manufacturing operation  |                      | •           |                     |     |          |                      |                 |                     |                                   |                           |              |          |
| 5.5.2 All precautions to protect workers, bystanders, surrounding communities and the environment are taken when establishing production facilities in developing countries   |                      | •           |                     |     |          |                      |                 |                     |                                   |                           |              |          |
| 5.5.3 Manufacturing and formulations plants are properly sited and wastes and effluents are adequately controlled   |                      | •           |                     |     |          |                      |                 |                     |                                   |                           |              |          |
| 5.5.4 Relevant standards of purity, performance, stability and safety are complied with   |                      | •           |                     |     |          |                      |                 | •                   |                                   |                           |              |          |
| <b>6 Regulatory and Technical Requirements</b>  |                      |             |                     |     |          |                      |                 |                     |                                   |                           |              |          |
| 6.1.2 Pesticides cannot be made available until they have been registered   |                      |             |                     |     |          |                      |                 |                     |                                   |                           | •            |          |
| 6.2.1 An objective assessment of the data for the pesticide should be provided, in order to allow a risk management decision to be made   |                      |             |                     |     |          |                      |                 |                     |                                   |                           |              |          |
| 6.2.2 National regulatory authorities are provided with new or updated information which could change the regulatory status of the pesticide  |                      |             |                     |     |          |                      |                 | •                   |                                   | •                         |              |          |
| 6.2.3 The active ingredient and other ingredients in pesticide products marketed correspond to the ingredients evaluated for toxicological and environmental acceptability  |                      |             |                     |     |          |                      |                 | •                   |                                   |                           |              |          |
| 6.2.4 Active ingredients and formulations, for which international specifications have been developed, conform to relevant FAO and WHO specifications   |                      |             |                     |     |          |                      |                 | •                   |                                   |                           |              |          |
| 6.2.5 The quality and purity of pesticides offered for sale is verified   |                      |             |                     |     |          |                      |                 | •                   |                                   |                           |              |          |
| 6.2.6 Corrective action is taken voluntarily when problems occur, and help is given to governments to find solutions to difficulties  |                      |             |                     |     |          |                      |                 | •                   |                                   |                           |              |          |
| 6.2.7 Available data on export, import, manufacture, formulation, sales, quality and quantity of pesticides is provided to national governments upon request  |                      |             |                     |     |          |                      |                 | •                   |                                   | •                         |              |          |
| <b>8 Distribution and Trade</b>   |                      |             |                     |     |          |                      |                 |                     |                                   |                           |              |          |
| 8.2.1.1 Pesticides entering international trade conform to relevant FAO, WHO or equivalent specifications, where such specifications have been developed; to relevant FAO guidelines on classification, packaging and labelling; and, to rules and regulations of UNCTDG and international organisations concerned with specific modes of transport |                      |             | •                   |     |          |                      |                 | •                   | •                                 |                           |              |          |
| 8.2.1.2 Pesticides manufactured for export of the same quality as those of comparable domestic products   |                      | •           |                     |     |          |                      |                 | •                   |                                   |                           |              |          |
| 8.2.1.3 Pesticides manufactured or formulated by a subsidiary meet quality standards of the host country and of the parent company  |                      | •           |                     |     |          |                      |                 | •                   |                                   |                           |              |          |
| 8.2.2 Pesticides manufactured for export of the same quality as those of comparable domestic products   |                      | •           |                     |     |          |                      |                 | •                   |                                   |                           |              |          |
| 8.2.3 Pesticides manufactured or formulated by a subsidiary meet quality standards of the host country and of the parent company  |                      | •           |                     |     |          |                      |                 | •                   |                                   |                           |              |          |
| 8.2.4 Fair marketing and distribution practices are followed, and assistance is provided to governments to eliminate malpractice within the industry  |                      |             |                     |     |          |                      |                 | •                   |                                   |                           |              |          |
| 8.2.6 Pesticides are traded by reputable traders, who should preferably be members of a recognised trade association  |                      |             |                     |     |          |                      |                 | •                   |                                   |                           |              |          |
| 8.2.7 Persons involved in the sale of pesticides hold appropriate government licenses and are adequately trained to provide customers with appropriate advice on safe and effective use   |                      |             | •                   |     | •        |                      |                 |                     |                                   |                           |              |          |
| 8.2.8 A range of pack sizes and types is provided to meet the needs of small-scale farmers and other local users  |                      |             |                     |     | •        | •                    |                 |                     |                                   |                           |              |          |
| <b>9 Information Exchange</b>   |                      |             |                     |     |          |                      |                 |                     |                                   |                           |              |          |
| 9.3 Information on pesticides (inc. analysis) provided  |                      |             |                     |     |          |                      |                 | •                   | •                                 | •                         |              |          |
| 9.4.1 Information on pesticide residues in food is provided   |                      |             |                     |     |          |                      |                 | •                   |                                   |                           | •            |          |
| 9.4.2 Collaborate to provide information on the Code of Conduct   |                      |             |                     |     |          |                      |                 | •                   |                                   |                           |              |          |
| <b>10 Labelling, Packaging, Storage and Disposal</b>  |                      |             |                     |     |          |                      |                 |                     |                                   |                           |              |          |
| 10.1 All pesticide containers are clearly labelled in accordance with applicable guidelines   |                      |             | •                   | •   | •        | •                    |                 |                     |                                   | •                         |              |          |
| 10.2.1 Registration requirements are complied with and use recommendations are consistent with those of national research and advisory agencies   |                      |             |                     |     |          |                      |                 |                     |                                   |                           | •            |          |
| 10.2.2 Appropriate symbols and pictograms are used whenever possible, in addition to written instructions, precautions and warnings in the appropriate language   |                      |             | •                   |     | •        | •                    |                 |                     |                                   |                           |              |          |
| 10.2.3 Products in international trade comply with national or international labelling requirements, and, if appropriate, clearly show the appropriate WHO hazard classification  |                      |             |                     |     | •        |                      |                 | •                   |                                   |                           |              |          |
| 10.2.4 Warnings against re-use of containers and instructions for safe disposal or decontamination are included in the appropriate language   |                      |             |                     |     |          | •                    |                 |                     |                                   |                           |              |          |

| FAO Code Articles Relevant to Industry  | Stewardship Elements |             |                     |     |          |                      |                 |                     | Regulatory and Technical Elements |                           |              |          |
|---|----------------------|-------------|---------------------|-----|----------|----------------------|-----------------|---------------------|-----------------------------------|---------------------------|--------------|----------|
|   | R&D                  | Manufacture | Storage & Transport | IPM | Safe Use | Container Management | Obsolete Stocks | Stewardship General | Technical Specifications          | Technical Recommendations | Registration | Residues |
| 10.2.6 Labels clearly show the release date of the lot or batch and relevant information on storage stability   |                      | •           | •                   |     |          |                      |                 |                     |                                   |                           |              |          |
| 10.3.1 Packaging, storage and disposal of pesticides conform to FAO, UNEP or WHO guidelines or to other applicable international guidelines   |                      | •           | •                   |     |          |                      | •               |                     |                                   |                           |              |          |
| 10.3.2 Packaging and repackaging are conducted only on licensed premises, where the staff is adequately protected against toxic hazards. Checklist for Traders and Formulators  |                      | •           | •                   |     |          |                      |                 |                     |                                   |                           |              |          |
| 10.5 Assistance is provided to inventory obsolete stocks of pesticides and unused containers; to develop an action plan for their disposal; to dispose of obsolete pesticides; and, to prevent the accumulation of obsolete pesticides and used containers in the future. |                      |             |                     |     |          |                      | •               |                     |                                   |                           |              |          |
| <b>11 Advertising</b>   |                      |             |                     |     |          |                      |                 |                     |                                   |                           |              |          |
| 11.2.1 All statements used in advertising are technically justified   |                      |             |                     |     |          |                      |                 | •                   |                                   |                           |              |          |
| 11.2.2 Advertisements do not contain any statement or visual presentation which may mislead the buyer regarding the safety of the product, its suitability for use, or the status of its registration or approval   |                      |             |                     |     | •        |                      |                 |                     | •                                 | •                         |              |          |
| 11.2.3 Pesticides which are restricted to use by trained or registered operators are advertised only through journals specifically catering to such operators; otherwise, the restricted availability of the product is clearly shown                                     |                      |             |                     |     | •        |                      |                 |                     |                                   |                           |              |          |
| 11.2.4 Pesticides containing different active ingredients or combinations of ingredients are not marketed under a single brand name   |                      |             |                     |     |          |                      |                 | •                   |                                   |                           |              |          |
| 11.2.5 Advertising does not encourage unapproved uses   |                      |             |                     |     | •        |                      |                 |                     | •                                 |                           |              |          |
| 11.2.6 Recommendations in promotional material are consistent with those of recognised research and advisory agencies   |                      |             |                     |     |          |                      |                 |                     | •                                 |                           |              |          |
| 11.2.7 Advertisements do not misuse research results, quotations from technical and scientific literature, or jargon to give claims the false appearance of having a scientific basis   |                      |             |                     |     |          |                      |                 |                     |                                   |                           |              |          |
| 11.2.8 Claims of "safe," "non-poisonous," "harmless," "non-toxic," or "compatible with IPM" are not made without a qualifying phrase, such as "when used as directed"   |                      |             |                     | •   | •        |                      |                 |                     |                                   |                           |              |          |
| 11.2.9 Statements are not made comparing the risk, hazard or "safety" of different pesticides   |                      |             |                     |     | •        |                      |                 |                     |                                   |                           |              |          |
| 11.2.10 Misleading statements are not made concerning the effectiveness of the product  |                      |             |                     |     |          |                      |                 |                     | •                                 |                           |              |          |
| 11.2.12 Advertisements do not contain any visual representation of potentially dangerous practices  |                      |             |                     |     | •        |                      |                 |                     | •                                 |                           |              |          |
| 11.2.13 Advertising and promotional literature draws attention to the appropriate warning phrases and symbols   |                      |             |                     |     | •        |                      |                 |                     |                                   |                           |              |          |
| 11.2.15 False or misleading comparisons with other pesticides are not made  |                      |             |                     |     |          |                      |                 | •                   | •                                 |                           |              |          |
| 11.2.14 Technical literature provides appropriate information on recommended application rates, frequency of applications, and pre-harvest intervals  |                      |             |                     |     | •        |                      |                 |                     | •                                 |                           |              |          |
| 11.2.16 Staff involved in sales promotion are adequately trained to provide complete, accurate and valid information on the products sold   |                      |             | •                   | •   |          |                      |                 |                     |                                   |                           |              |          |
| 11.2.17 Advertisements encourage purchasers and users to read the label carefully, or to have the label read to them if they cannot read  |                      |             |                     |     | •        |                      |                 |                     |                                   |                           |              |          |
| <b>12 Monitoring and observance of the Code</b>   |                      |             |                     |     |          |                      |                 |                     |                                   |                           |              |          |
| 12.8 Code observance reported to FAO  |                      |             |                     |     |          |                      |                 | •                   |                                   |                           |              |          |
| 12.9 Code implementation monitored and reported to FAO  |                      |             |                     |     |          |                      |                 | •                   |                                   |                           |              |          |

## Appendix 4: Publications

### Manufacturing:

**Implementing Contamination Prevention**



**Manufacturing**  
 Respect for people  
 and the environment



### Storage, Transport and Distribution:

**Guidelines**  
 for the safe  
 transport of  
 crop  
 protection  
 products



**Guidelines**  
 for the safe  
 warehousing of  
 crop  
 protection  
 products



**Storage,  
 Transportation  
 and  
 Distribution**  
 Safety  
 assurance  
 from factory  
 to farm



### IPM/Responsible Use:

**Integrated Pest Management –**  
 The way forward  
 for the plant  
 science industry



**Safe Use**  
 The responsible and  
 effective use of  
 crop  
 protection  
 products



IPM/Responsible Use (continued):

**Integrated Pest Management –**  
The way forward for the plant science industry (Leaflet)



**Guidelines**  
for the safe and effective use of crop protection products



**Guidelines**  
for personal protection when using crop protection products in hot climates



**IPM Responsible Use**  
Case Studies

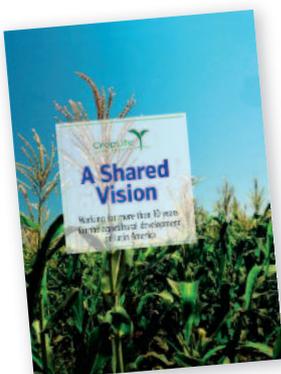


agLearn



[www.agLearn.net](http://www.agLearn.net)

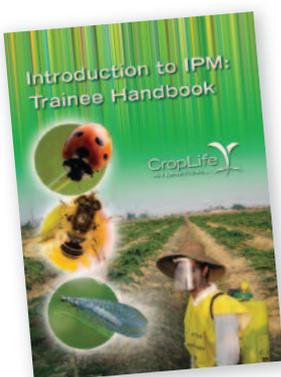
**A Shared Vision**  
Working for more than 10 years for the agricultural development of Latin America



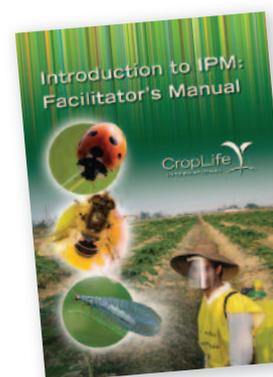
**The adventures of the team 'Growers of the Future'**



**Introduction to IPM:**  
Trainee Handbook



**Introduction to IPM:**  
Facilitator's Handbook



**Container Management:**

**Roadmap for establishing a container management programme for collection and disposal of empty pesticide containers**



**Safe Use**  
 The responsible and effective use of crop protection products



**Triple-rinse your used pesticide containers!**  
 (Poster)

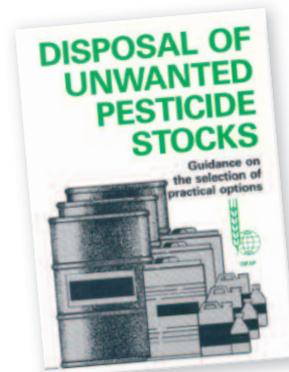


**Obsolete Stocks:**

**IPM Responsible Use**  
 Managing obsolete stocks of crop protection products



**Disposal of unwanted pesticide stocks**  
 Guidance on the selection of practical options



Implementation of the International Code of Conduct on the Distribution and Use of Pesticides:

**Guide for Industry of the Implementation of the FAO Code of Conduct on the Distribution and Use of Pesticides**



**ELearning modules**



[elearning.croplife.org](http://elearning.croplife.org)

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