

**ENVIRONMENTAL ASPECTS IN PLANT PROTECTION PRACTICES
OF NON-AGRICULTURAL PESTICIDE USERS:
CASE STUDY OF COMMUNES AND THE MINISTRY OF PUBLIC WORKS
AND TRANSPORT (MET) OF THE WALLOON REGION (BELGIUM)**

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Summary

In order to gain a better understanding of non-agricultural pesticide use and to prepare the legislative and technical dossiers required under the Water Framework Directive, between October 2006 and March 2007, two surveys were conducted of 97 Walloon communes and 65 districts of the Walloon Ministry of Public Works and Transport (MET) (General Directorates for Motorways and Roads and for Waterway Infrastructure). The questionnaire (26 questions on six topics) was sent by e-mail or fax, with a response rate of 60 out of 97 communes and 33 out of 65 districts. This article describes the environmental aspects of the surveys (health-related aspects are the subject of separate article). The surveys have brought to light a number of good practices (including zero pesticides) and a growing awareness of environmental issues among non-agricultural users. However, bad habits, legislation infringements and a failure to follow good plant protection practice are still a problem and pose major environmental risks (in the form of water pollution from pesticides). Information, awareness-raising and training therefore remain a priority for non-agricultural users.

Introduction

Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy (known as the Water Framework Directive, or WFD for short) sets the goal of achieving "good ecological and chemical status" by 2015 for all Europe's bodies of surface water and groundwater. The implementation of the Directive involves the preparation of management plans covering hydrographic districts. These management plans, which will come into force in late December 2009, include a programme of measures for achieving the good-status goal. The Nile pilot project demonstrated that, irrespective of whether pesticide users are agricultural or non-agricultural, simple compliance with good plant protection practice (especially when preparing treatments) drastically reduces point-source and diffuse leakage of pesticides into water. To be able to propose the most appropriate measures, it is first necessary to make a situation assessment of the various bodies of water, which was done in 2004. There is enough knowledge of farming practices to calculate potential exposure levels from plant protection products. By contrast, non-agricultural uses of pesticides are less well known.

Even though the quantities of plant protection products used in the non-agricultural sector are much smaller than in agriculture, the risks to the environment tend to be much higher because the surfaces being treated are either not very permeable or impermeable (pavements, cobblestones, gravel, and so forth) and may be directly or indirectly linked with surface water and/or groundwater.

As part of a collaboration effort between the Walloon Region of Belgium (Surface Water Department of the General Directorate for Natural Resources and the Environment (DGRNE)) and the Gembloux Agricultural University (FUSAGx), two surveys were conducted to ascertain the plant protection practices of non-agricultural pesticide users. The first survey was of communes and supplements two prior surveys. The second survey was of the Walloon Ministry of Public Works and Transport (MET) - distributed into departments each containing various districts - which manages the following aspects:

- Road and motorway network and infrastructure.
- Waterways, inland ports, dams, locks and hydraulic lifts.
- Regional airports and public airfields.
- Mobility and intermodal transport.
- Walloon government buildings.
- Telecommunications (fibre optic network, digital audio broadcasting, cyber schools, etc).

The main aim of these surveys is to gain an overview as objective and representative as possible of the plant protection practices of non-agricultural pesticide users. This will allow an informed choice to be made of the measures that will be included in the WFD programmes of measures. The survey results have also influenced the current debate on the amendment of Walloon legislation of 1984 and 1986 banning the use of herbicides in public places.

Study methodology

Background of the study

The surveys were carried out throughout the Walloon Region of Belgium, divided into 5 provinces: Brabant Wallon, Hainaut, Liege, Luxembourg and Namur. The first survey covers a selection of communes and the second covers two general directorates of the Walloon Ministry of Public Works and Transport (MET): the General Directorate for Waterway Infrastructure and the General Directorate for Waterway Infrastructure.

Sample selection

A statistical selection was made of 97 communes on the basis of 2 criteria:

- *Number of residents* (seven categories: 'fewer than 5,000', '5,000 to 10,000', '10,000 to 20,000', '20,000 to 30,000', '30,000 to 50,000', '50,000 to 100,000' and 'more than 100,000' residents);
- *Surface area of the commune* (12 categories: 'less than 2,000', '2,000 to 3,000', '3,000 to 4,000', '4,000 to 5,000', '5,000 to 6,000', '6,000 to 7,000', '7,000 to 8,000', '8,000 to 9,000', '9,000 to 10,000', '10,000 to 15,000', '15,000 to 20,000' and 'more than 20,000' hectares).

After reclassifying the communes that had already participated in two prior surveys (PHYTO Regional Committee (CRP), 2006 and Deneufbourg, 2006) in line with the above two criteria, 97 communes were chosen to represent 50% of each of the population and surface-area categories in each of the Walloon provinces. Using such a large number of categories allowed the extremes to be represented more effectively (very small and very large communes). This made it possible to convince very small communes to respond to the survey. Indeed, a very small commune that uses very little product (1-2 litres per year) but does so in a highly inappropriate way in a sensitive environment can do just as much harm as a large commune that uses a lot of product but follows good practice. In the case of the MET, all the districts of the General Directorate for Motorways and Roads (42) and the General Directorate for Waterway Infrastructure (23) were contacted, making a total of 65 districts.

Data collection

The survey of communes took place over a three-month period (late October to December 2006) and that of the MET took place over a 3-4 month period (late November 2006 to March 2007). The data were collected by means of:

- A questionnaire sent directly by e-mail or fax to the people responsible for phytosanitary treatments.
- Telephone contacts and visits to obtain further information on the replies provided.

Questionnaire structure

The questionnaire focused mainly on the conditions of pesticide use and health and environmental impacts. There is very little difference between the 'communes' questionnaire and the MET questionnaire (apart from a few changes concerning the type of surface treated). The 26 questions were divided into 6 topics:

- General (two questions).
- Techniques used (two questions).
- Choice of techniques, interventions and products (four questions).
- Product storage (two questions).
- Product application: equipment and method (14 questions).
- Information (two questions)

Survey results

General

The response rate was remarkably high for a survey of this kind: 62% (60/97) for the communes survey and 51% (33/65) for the MET survey. In each of the following graphs, the response rate is cited as a percentage of all replies. However, not all the communes and districts that participated in the surveys necessarily answered all the questions. To simplify matters, where no response was given to a question, a negative answer was recorded to ensure that all the percentages were calculated in relation to the total number of replies (60 communes and 33 districts). The people that answered the questionnaire for the communes can be broken down as follows:

- Department head (works or environment): 26
- Foreman or inspector of works/Supervisor: 18
- Environmental consultant: 12
- Employee: 4
- Representative (municipal works or environment councillor): 4

The total exceeds 60 because some of the questionnaires were completed by two people (usually the foreman of works and the environmental consultant). In the case of the MET, the vast majority of respondents (29) were district heads. There were also four deputies or assistants and three covering letters from directors/department heads.

Size of the communes that answered the questionnaire

The following table breaks down the communes that answered the questionnaire on the basis of their size and population.

Table 1. Breakdown of communes that answered the questionnaire in accordance with surface area (hectares) and population (residents)

Surface area (ha)												
1 - 2000	2001 - 3000	3001 - 4000	4001 - 5000	5001 - 6000	6001 - 7000	7001 - 8000	8001 - 9000	9001 - 10000	10001 - 15000	15001 - 20000	> 20000	Total
5	8	10	6	5	8	2	3	1	8	2	1	59
(+2)	(+3)	(+5)	(+4)	(+4)	(+2)	(+4)	(+1)	(+1)	(+6)	(+3)		(+35)
29,2 %	26,8 %	39,5 %	38,5 %	42,9 %	52,6 %	35,3 %	33,3 %	16,7 %	37,8 %	38,5 %	50,0 %	35,9 %

Population (residents)							
1 – 5000	5001 – 10000	10001 – 20000	20001 – 30000	30001 – 50000	50001 – 100000	> 100000	Total
18	20	15	3	1	2		59
(+4)	(+10)	(+10)	(+6)	(+1)	(+1)	(3)	(+35)
30,6 %	34,1 %	39,7 %	36,0 %	40,0 %	50,0 %	100,0 %	35,9 %

Note: in italics (between brackets), number of communes already polled in the past.

Note: the percentages represent the surface area or population categories as a proportion of all the communes in the category.

Note: although there were only 59 communes in all, one commune returned two questionnaires (cemetery + green areas), totalling 60 replies.

Types of surface treated and techniques used

The surfaces treated (all treatments combined) are essentially impermeable or not very permeable: gravel and cobblestones, as well as kerbs, gutters and collectors, despite being banned by current legislation (Walloon Regional Executive Decrees (AERW) of 1984 and 1986 banning the use of herbicides on certain public property).

Of all the treatments, chemical pest control is the most commonly-used form of control by both communes (95%) and the MET (88%), followed by manual treatment, then mechanical treatment (brush-weeding + cutting). Only four communes use heat treatment. These non-agricultural users were asked what they thought about non-chemical techniques. The vast majority believe that non-chemical techniques require more personnel. Forty-seven percent of communes and 51% of districts believe that non-chemical techniques are suited to the situations encountered in the field. Not many have already tried integrated pest control (30% of communes and 21% of districts). Their feeling is that integrated pest control requires more work and in some cases is less effective than chemical control.

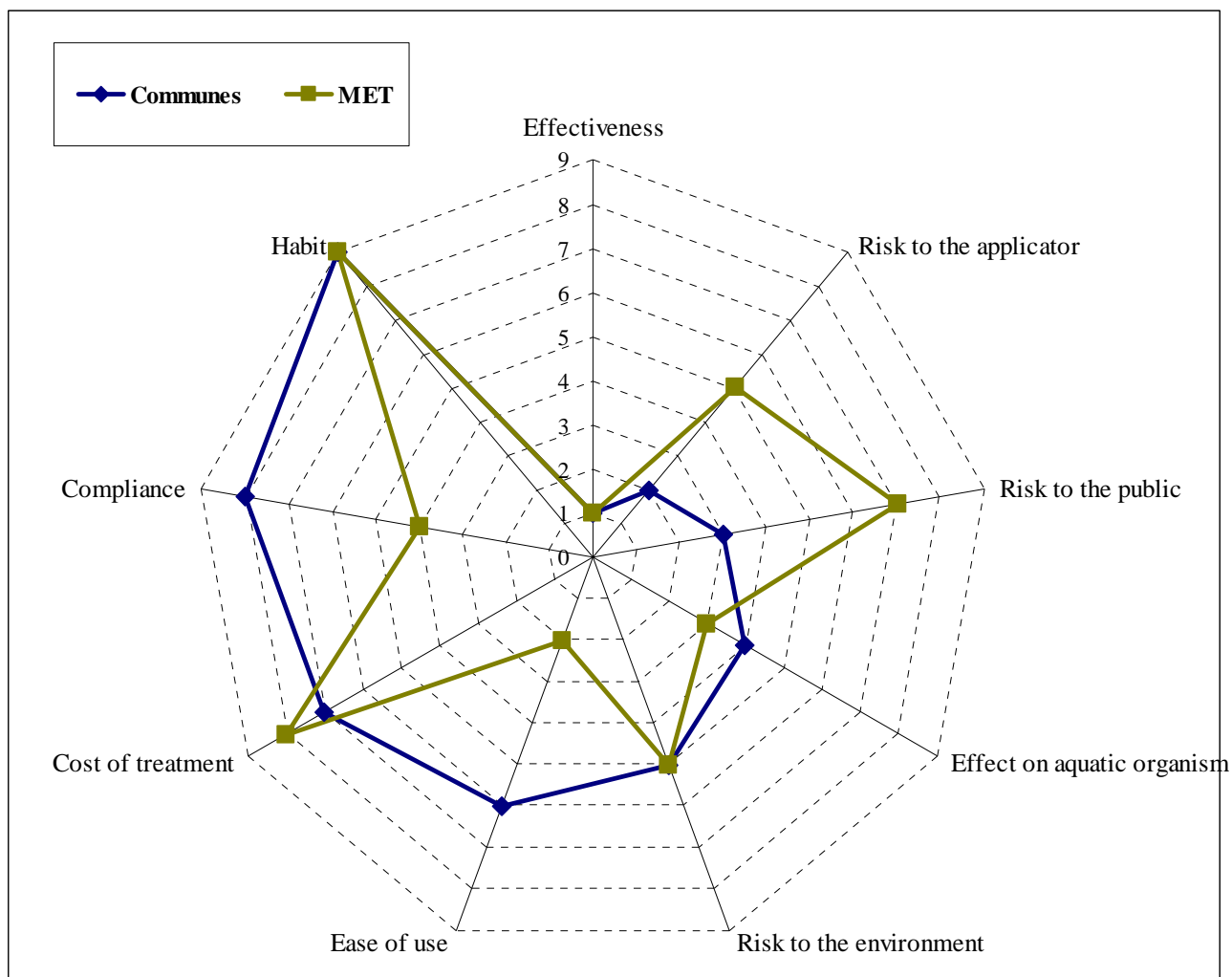
Choice of techniques, interventions and products

Treatment frequency: although the majority of non-agricultural users (67% of communes and 64% of districts) treat when they notice weeds or pests, there are still 47% of communes and 42% of districts that systematically treat according to a fixed schedule (for both mechanical and chemical treatments).

Treatment decision: It is mainly the department head that takes the treatment decision (65% of communes and 73% of districts) but, in some cases, it is municipal councillors who decide (particularly in small communes). In many cases, the decision is taken jointly by several people (e.g. department head and applicator).

Criteria for the treatment decision: for both communes and the MET, the foremost criterion for the treatment decision is cleanliness, then safety, aesthetics and demand from residents.

Factors influencing the choice of technique: Graph 1 represents the respective importance of the factors involved in choosing treatment techniques (with 1 ranking as the most important and 9 the least important).



Graph 1. Elements guiding a non-agricultural user's choice of treatment techniques

For non-agricultural users, effectiveness is the most important criterion for choosing a technique. The next most important criterion for communes is risk, then ease of use, cost, regulations and habit. The MET attributes more importance to ease of use and regulations than to risk, cost and habit. It has not been possible to confirm this information in the field. The replies would appear to be somewhat fanciful, judging by the rest of the questionnaire. It is surprising to find cost so far down in the ranking when all complain of lack of funding. Compliance with regulations is also considered to be of little importance (especially to communes). Indeed, there are many infringements of legislation but controls are virtually non-existent.

Storage of plant protection products

53% of communes and 73% of districts have a special room for storing pesticides. In 35% of communes and 48% of districts, the room is fitted with a system for preventing products from

leaking outside. In 10% of communes and 6% of districts, the room is close to a collector, watercourse or ditch.

Application of plant protection products: equipment and method

Type of equipment used: the most common type of equipment used by non-agricultural users is the knapsack sprayer (93% of communes and 73% of districts), then rotary brush weeders (65% of communes and 51% of districts) and trailer-mounted wand sprayers (63% of communes and 45% of districts). Some communes use ramp-mounted sprayers without apparently being aware that they are subject to a compulsory technical inspection every three years. A minority (25% of communes and 15% of districts) state that they calibrate and/or adjust their equipment every one to three years.

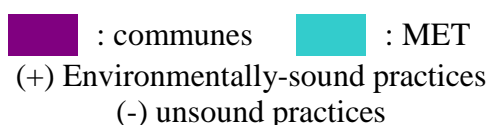
Who conducts phytosanitary treatments? In most cases, it is the administration itself that carries out the treatments (92% of communes and 70% of districts). Owing to staff shortages, the MET makes more frequent use of external service providers (5% of communes and 33% of districts). Only one commune and four districts state that they no longer use any plant protection products at all.

Calculating the quantity of product to be applied: in most cases it is the applicator who calculates the correct proportion of product to be applied (without necessarily having the expertise to do so) (50% of communes and 48% of districts). However, in many cases, several people jointly calculate the dosage rate of product (e.g. the department head and the applicator, the supervisor and the applicator, and so forth). In nine MET districts out of 28, it is the external service provider who calculates the proportion.

Conditions for preparing phytosanitary treatments

Finds the products easy to mix	+	93 %
	+	82 %
Use of the product always corresponds to its approval category	+	77 %
	+	76 %
Always uses the same personnel for phytosanitary treatments	+	60 %
	+	27 %
Prepares the mixtures on a permeable surface	+	47 %
	+	24 %
Prepares the mixtures on an impermeable surface linked to the sewers	-	35 %
	-	54 %
Has a system for preventing water pollution when filling the tank	+	23 %
	+	21 %
Provides the personnel responsible for treatments with in-service training	+	15 %
	+	3 %
Prepares the mixtures on an impermeable surface with water recovery and treatment	-	12 %
	-	9 %

Graph 2. Plant protection practices: preparing treatment - % of positive answers



The majority of non-agricultural users (93% of communes and 97% of districts) use mains water to prepare the mixtures. The others use rainwater. Practices are much the same in both communes and the MET, except for the personnel carrying out treatments.

While communes try to always entrust treatments to the same personnel (60%), as a result of staff shortages, the MET entrusts treatment to the same personnel in only 27% of cases. Likewise, while communes prepare the mixtures of plant protection products mainly on a permeable surface (47%), the MET prepares its treatments mainly on an impermeable surface linked to the sewers (54%). Only around 10% of non-agricultural users state that they check on the Phytoweb site that the products they employ have been approved for the use which they make of them.

Most commonly-used plant protection products

The communes use an average of 2.4 products per commune, whilst the MET uses only 1.8 products per district. Table 2 below lists the main products.

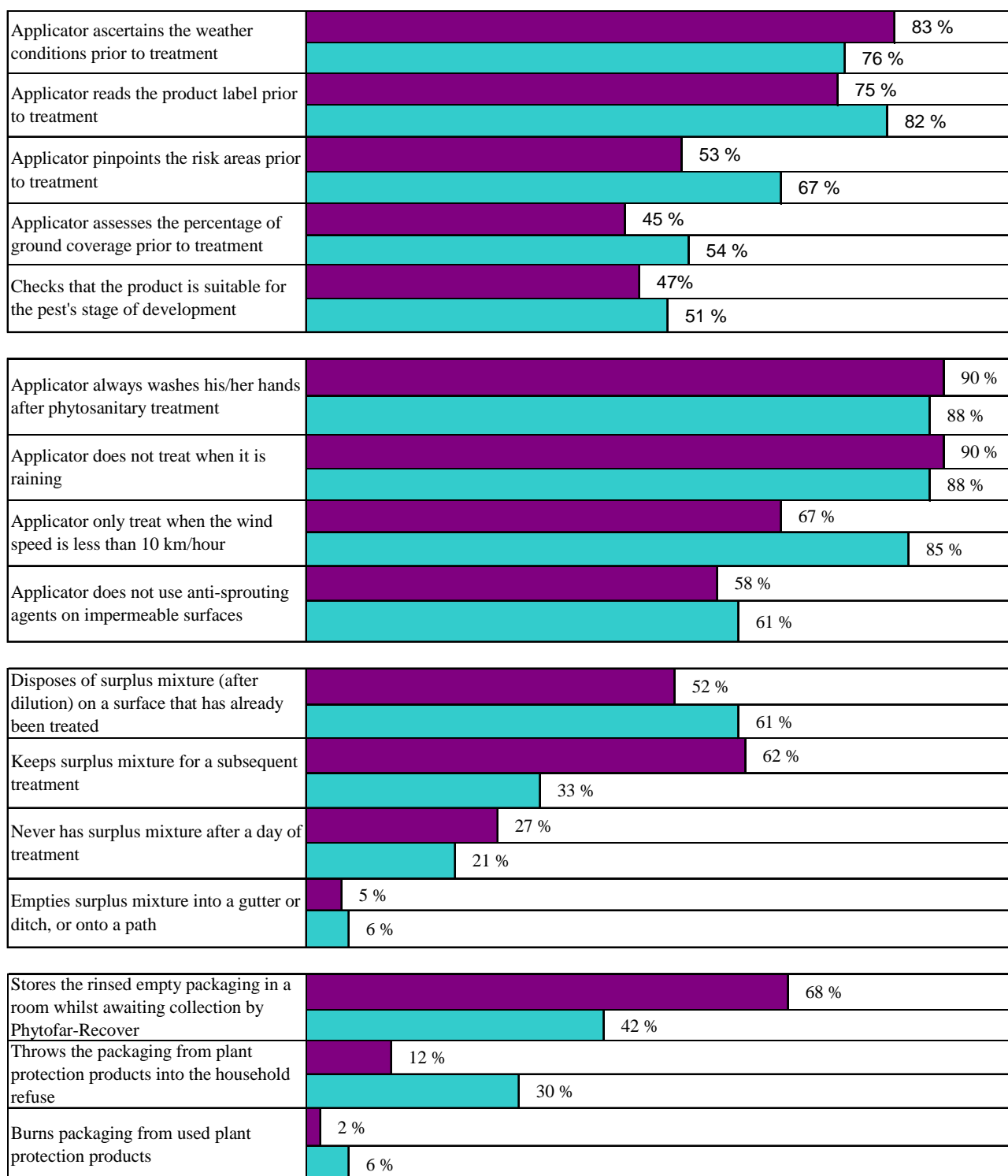
Table 2. Main plant protection products used by the communes and the MET (all herbicides)

Active substance and concentration	Commercial product	Communes (%)	MET (%)
Glyphosate 360 to 450 g/l - liquid	Various products	43	70
Glyphosate with other active substances (diflufenican, diuron, oxadiazon, etc.) - liquid	Various products	72	64
112 g/l glyphosate + 15 g/l diflufenican + 71 g/l diuron - liquid	CANYON®	43	39
6.75% dichlobenil - granules	CASORON GR®	30	15
Triclopyr: 100 or 480 g/l - liquid	Various products	18	24
10.8% glyphosate + 30% oxadiazon - wettable powder	KID ALLEES®	17	-
25% flazasulfuron – wettable granules	CHIKARA®	12	-
40 g/l diflufenican + 250 g/l glyphosate - liquid	ZAPPER®	12	21
20 g/l clopyralide + 40 g/l fluroxypyr + 200 g/l MCPA - liquid	BOFIX®	10	15

Although CANYON® is solely approved for use on loose ground that is not under permanent cultivation, it is often used on inappropriate surfaces (gravel, cobblestones, kerbs, gutters, etc.). Certain communes and MET districts use pesticides that have not been licensed for non-agricultural use, as well as products not approved in Belgium. The vast majority of products (87% in communes and 78% in districts) are applied in springtime (from late March to June).

The information concerning the dosage rates of product to be applied is often incomplete and no conclusions can be drawn from it. Certain products are applied at a lower than standard dose (e.g. CASORON GR®). The application frequency and period do not always comply with the instructions on the label (e.g. applying CANYON® twice a year instead of once a year).

Practices of personnel responsible for treatments with plant protection products



Graph 3. Comparison of plant protection practices between communes and MET - % of positive answers

■ : communes ■ : MET

Not only are 73 Walloon communes directly involved in the collection system of the PHYTOFAR-RECOVER non-profit association (set up by product manufacturers), some have informed us that they return their packaging to their pesticide distributor, which is automatically affiliated to the system.

The MET instead has a system of different containers (one for chemical and related products), which are regularly collected by specialist firms. Burning of packaging (one commune and two districts) essentially applies to cardboard packaging containing preparations in granules or in water-soluble sachets. One commune admits that the cans are sometimes re-used for diesel oil.

Reporting of completed phytosanitary treatments

Thirty-seven percent of communes and 58% of districts systematically report on treatments every day.

Conclusions

Like the previous surveys, these surveys have shown that a lot still remains to be done to achieve sustainable and responsible use of pesticides in the non-agricultural sector. Work is needed in the following areas:

- Improving communication.
- Raising the awareness of stakeholders: users (applicators) and purchasing decision-makers.
- Training applicators in good plant protection practice.
- Checking the application equipment used.
- Gearing current legislation to real requirements in the field and to the need to control risk.
- Promoting alternative methods.

With regard to improving **communication**, tools already exist, such as the Phytoweb site and the website of the Regional PHYTO Committee (*Comité Régional Phyto*), the Walloon advisory committee on environmentally-sound pesticide use, as well as the Committee's publications (in particular the guide to good weed-control practice in green areas and public highways (*Guide de Bonnes Pratiques de Désherbage des Espaces Verts et des Voiries*, published in 2006). However, a more specific communication on 'what product can be used on what surface and in what quantity' should be envisaged. This could be done via an easier and more user-friendly Phytoweb site, for example (along the lines of the mini-search engines that manufacturers of plant protection products have developed for their websites) using simpler keywords (e.g. 'gravel, cemetery, pavement or cobblestones' rather than 'non-cultivable surfaced land'). Although the Phytoweb site is being overhauled, the communes must also be made aware of its existence via the Union of Cities and Municipalities of Wallonia (Union des Villes et Communes de Wallonie), which represents all the local authorities of the Walloon Region. The MET districts could be made aware of this via D433, the Integration with the Landscape and Heritage Department (Direction de l'Intégration Paysagère) for example.

Raising awareness of stakeholders calls for the involvement of a whole series of bodies, such as the Regional PHYTO Committee, Phytofar non-profit association (especially the Phytofar-Recover scheme), ADALIA non-profit association, Pôle de Gestion Différenciée des Espaces Verts, SPGE, the public agency in charge of coordinating water management in Wallonia (and its 'Eau Secours' campaign), PhytEauWal non-profit association, and others. Whilst awareness-raising actions should focus mainly on applicators, it is also important to raise awareness among decision-makers. Indeed, it is they who govern the process by dictating the options and the products that will be used. A few examples of awareness-raising actions: meeting of Walloon river contracts (*contrats de rivière*) to discuss pesticides in water; demonstration days of alternative equipment; brochures, and so forth.

It is also important to develop training for applicators. This aspect is addressed by the Federal Programme for Reducing the Agricultural Pesticides and Biocides (PRPB). An inventory of training courses available in the Walloon Region was made in the first half of 2007 to take into

account the requirements of the future European regulations currently under discussion. Around twenty organisations dispense training to a highly varied audience (from private individuals to farmers and landscape gardeners to public services) and, although some courses are more advanced than others, in general they all provide a broad overview of good plant protection practice.

It is necessary to ensure that the **equipment** is properly maintained (essentially knapsack sprayers and vehicle-mounted wand sprayers). One third of the communes polled and less than one quarter of the districts stated that they adjust and calibrate their equipment (every one to three years). Although only ramp-mounted or trailed sprayers are currently subject to a compulsory technical inspection every three years, future European regulations tend to extend compulsory technical inspection to all equipment used by professionals (including knapsack sprayers). Be that as it may, it is already important to calibrate and adjust all types of equipment for phytosanitary treatment. The Regional PHYTO Committee's Guide to Good Practice provides simple rules for this.

The rather striking rate of infringement against current legislation is likely to stem from a lack of information coupled with poor controls. Indeed, the question of controls is a crucial part of the current review of Walloon legislation.

These surveys have brought to light a number of good practices (including zero pesticides), as well as some problems with the improper use of plant protection products or even the use of products that have not been approved or are not licensed for non-agricultural use.

The new decree on pesticide use in public places that is currently being drafted should serve as the basis for redefining the plant protection practices of communes and the MET, as well as for monitoring compliance with legislation and good plant protection practice. The flagship principle of the new decree is still a ban on pesticides on publicly-owned land. However, a series of exemptions is expected to permit the last-resort use of pesticides, with an obligation to apply integrated pest control principle. The emphasis will be placed on training, control and also support measures to enable managers of publicly-owned land to use alternative methods.

The decree will therefore advocate **alternative methods** to chemical control, which all too few non-agricultural users are using as yet. Users' main complaint about alternative methods is that they take more time and that the equipment is often costly for an effectiveness (compared with chemical control) that does not always live up to expectations. The promotion of such alternative techniques calls for communication, awareness-raising and training. A number of organisations specialise in alternative methods (e.g. ADALIA).

Acknowledgments

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