PROTECTING WATER

Steve Higginbotham of Aventis describes the finding of the recent Cherwell study which highlighted the need for on-farm best practice in handling crop protection products

Introduction

The quality of UK drinking water is of a high standard, but the array of pollutants that must be removed or severely reduced is astounding. They include for example heavy metals, bacteria, organic materials, industrial pollutants, nitrates, lead, aluminium and pesticides. All these are controlled in the production of drinking water, with pesticides being strictly regulated at 0.1 part per billion* or the equivalent of 1 gram of active product in 10 million litres of water. However water companies do achieve the required quality standards through constant monitoring, treatment and high investment. There is also a high cost to the crop protection industry as it invests in emission control systems that alleviate the problem at the point of production. But recent studies have demonstrated that many pesticides that contaminate rivers and streams do so from their use on farms.

Drinking water is derived from a number of sources including rivers, reservoirs and groundwater and can at times contain trace amounts of pesticides. To understand the routes and mechanisms by which pesticides reach these waters, Aventis CropScience heavily invested in a number of studies in the UK, France and Germany.

The study in Germany showed that only 20% of the pesticide contamination of the Dammbac river was due to field sources, such as field surface runoff or drain flow. While in the UK the Cherwell study, which defined the importance of the various spray related operations that take place in the farm yard, attributed 45% of the contamination of the headwaters of the Cherwell (Oxfordshire, UK) to drainage from the farm yard. In France the importance of field surface run off in areas of high rain fall was demonstrated.

It was to reduce these trace amounts of pesticides that the proposed pesticide tax was originally designed. The crop protection industry, through its association, has agreed with Government to implement a pesticide stewardship package that will address this area. It is therefore critical that the farming industry puts into practice the lessons learnt from these and other studies and helps to meet the aims of the stewardship package and negate the necessity of this tax.

The Cherwell Study

During the autumn application of a residual herbicide to 40 hectares of winter wheat, the study found that the common-practice yard activities and tank filling processes were responsible for a considerable amount of the local surface water contamination. Sprayer filling, poor empty package management and machinery maintenance were the main culprits.

- When pouring, glugging from containers and small splashes accounted for a number of spilt droplets which individually looked insignificant. But each drop of active ingredient can contain up to half a gram of active material.
- Leaking equipment and dripping nozzles also contribute. One small spillage in the study contained 1.2 grams of active material.
- Discarded container seals can be coated with a gram of active material, there were at least 40 containers opened during this study!
- Upturned containers may indicate they are empty but the rinsate leaking from these contributed more than a third of a gram of active material (Figure 1).

In total 7 grams of active product were spilt on the farm yard and found its way into the river.

These figures **appear** to be completely insignificant but because of the stringency of the permitted level of pesticides in water it would require 70,000,000 litres of water to dilute these few grams to the drinking water requirement! Or enough water to fill 35,000 large trailed sprayers.

Despite the importance of these minor amounts of active material, other studies have shown there is a potential for much greater contamination, For example:

- the sprayer sump contents even, after internal washings can contain 25 grams of product
- the outside of a sprayer can be coated with 10 grams of chemical after a few hours of work, this level will increased every time the sprayer is used if left uncleaned

Prevention

All is not doom and gloom. At Dammbac a 70% reduction of farm yard contamination was achieved through sprayer maintenance (replacing dripping nozzles *etc*), and the addition of a clean-water tank and a brush to allow the outside of the sprayer to be washed in the field. In the UK study a reduction from the farm yard of nearly 95% was achieved by some simple management changes.

So what can be done?

- Have a plan and the equipment to deal with spills and

*0.1 ppb is in effect a surrogate zero and is not based on either the health public or the environmental risk of individual compounds

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Figure 1. **Upturned 'empty' containers, with rinsate leaking – a source of potential water contamination.**

Figure 2. **Cat litter and other inert material which can be used to absorb spills and drips.**

drips, they will happen. Use inert material such as cat litter to absorb small spills (Figure 2).
- Do not wash spills into drains or leave to dry to be washed in later when it rains!
- Prevent glugging; even small splashes can significantly contaminate water. Remember that most neighboring farms will be doing the same job at the same time!
- If feasible fill sprayer in the field but well away from ponds and streams.
- Clean empty containers well, reseal and replace in boxes in an **upright** position to await disposal.
- Put seals and lids in cardboard packaging, not on the ground.
- Wash the sprayer in the field not the yard and store undercover.
- Do not store empty container outside.

All spray operators should examine their current practices and make sure they are doing all they can to prevent pesticides.

Future outlook

The Cherwell study was the first in the UK to document the importance of the farm yard as a site for contamination. It has formed the bases of a number of projects that aim to reduce this point source contamination. For example:

- the Environment Agency and the Soil Survey Reach Centre are both assessing the feasibility and effectiveness of biobeds with the hope that these will provide a safe mixing and filling area on the farm, (they have proved successful in Sweden);
- machinery manufacturers are redesigning their equipment to improve in-field washing capabilities;
- crop protection manufactures are reassessing their package designs.

Some may argue that rivers and streams do not need to be as clean as drinking water and that such care is not required. However legislation is getting tougher, for example the recent Water Framework Directive provides the water industry the opportunity to lobby regulators, legislators and European Commissioners to request severe restrictions on a number of widely used pesticides. If we, as the farming industry, do not adopt best practice and ignore the Crop Protection Association's pesticide stewardship initiative we will in the future not only have a pesticide tax but also risk the loss of a number of commonly used herbicides. The result will not only be an increased cost for all in the industry but will result in a severe reduction of product choice leading in turn to an increase in a number of difficult to control weeds.

Reference

Higginbotham, S.; Jones, R. L.; Gatzweiler, E.; Mason, P. J., Point source pesticide contamination, quantification and practical solutions. *Proceedings of the Brighton Crop Protection Conference (Weeds) 1999*, 681.

Steve Higginbotham has been Stewardship Manager for Aventis CropScience for a number of years and has been directly involved in research to understand better how pesticides find their way to surface water. He chairs the industry IPU (isoproturon) stewardship group and sits on the steering committee for the Environment Agency's project "Development of a Design Manual for Agricultural Pesticide Handling and Washdown Areas" which aims to produce a cost-effective solution to pesticide contamination from farmyards.