



Research shows that filling and washing down sprayers accounts for at least 40% of all the pesticides contaminating water.

Sprayer operators can sleep soundly with biobeds

A biobed is a simple way to prevent the inevitable drips and spills in the pesticide handling area from contaminating water. They are easy to make and provide farms with low cost method of preventing pollution. *Helen Riby explains how to go about making one.*

A biobed is not only a farmer friendly, practical, 'build it yourself' method of disposing of left-over pesticides, sprayer tanks and other washings, but it is also approved by the Environment Agency.

So with so much going for biobeds how come we haven't seen an explosion in their construction around the country?

Although they have been discussed for more than a decade, biobeds are still a rarity

on UK farms. According to ADAS pesticide expert Dr Paul Fogg all that talk is probably a major factor hindering their take-up now.

"While they have been discussed very positively since

the mid 1990s no-one could actively promote them until they had been thoroughly researched. Then, just when everyone was happy that they worked under UK conditions, they got caught up in the discussions about agricultural waste. It wasn't until last year that biobeds were granted an exemption to the Agricultural Waste Regulations making them a viable option for farmers and growers," he explains.

Biobeds are not a substitute for good practice but they are a great idea, because no matter how carefully operators carry out filling and mixing, some drops and spills will always occur. The amounts may be very small, but it has a significant impact. It only takes a tiny drop of pesticide concentrate to pollute a stream or river to levels above the EU drinking water limits – that is 0.1mg/litre for a single pesticide and 0.5mg/litre for all pesticides.

Indeed, research has shown that at least 40% of pesticides reaching water do so through what is called 'point source contamination' caused during filling and washing down the sprayer.

ADAS work on three Lincolnshire farms has shown that biobeds are very effective. In these trials, alongside normal commercial use, extreme and multiple incidents were simulated with pesticide concentrations up to 100,000 parts per billion measured in the liquid entering the biobeds. Even under such extremes the biobeds performed well removing 99% of the pesticides put onto them.

Thanks to funding from LAMMA (Lincolnshire Agricultural Machinery Manufacturers Association) ADAS has been able to continue to monitor all three original Lincolnshire biobeds.

These findings from this monitoring are now being used

along with new research funding from PSD (Pesticides Safety Directorate) to further develop the biobed idea.

Typically a biobed will consist of a 1m deep pit lined with a heavy duty synthetic liner, filled with a biomix consisting of one part peat substitute, one part topsoil and two parts wheat or barley straw. The biomix should be pre-composted and turfed over before any pesticides are put onto it.

There are two systems: The direct where the sprayer is filled over the biobed and any drips, spills and washings drop straight into the biobed; and the indirect

The direct system is more expensive because it requires a steel grid to take the weight of the sprayer. Depending on the size a DIY biobed will probably cost between £1,000 and £3,000 to build. Capital grants may be available under the England Catchment Sensitive Farming Capital Grant Scheme.

Management is straightforward, although the biomix needs topping up annually as it de-composes and compacts over time. "The biomix in the pit needs to be kept at a minimum depth of 1m to achieve the required level of treatment," explains Dr Fogg.



ADAS pesticide expert, Dr Paul Fogg, says biobeds have an exemption from the Agricultural Waste Regulations – making them a viable option for farmers and growers.

where there is a separate handling area with the biobed alongside. The handling area must be impermeable, banded and fitted with a drain so that liquid can be collected and stored securely. This liquid is then pumped from the temporary store through a drip irrigation system so that it is spread evenly onto the adjacent biobed. Both systems require a pump in the bottom of the biobed to transfer treated water for final irrigation or re-use.

The drains in the handling area must be kept clear of sediment so they will need to be cleaned from time to time and any soil residues placed directly onto the surface of the biobed. In the longer term the whole biomix will need replacing. Current advice is this must be done after five years. Spent biomix will need to be stored securely for 12 months or more to be sure all the pesticides have been degraded before spreading onto the land.

What size of biobed do I need?

■ Estimate your annual volume of pesticide waste and washings in litres. For example if you have a 2,000 litre sprayer and wash out the tank by filling with 10% of its capacity that's 200 litres each time it is washed out.

■ Calculate the amount of rainfall that will add to this volume. Do this by multiplying your annual rainfall (average data can be obtained from the Met Office website www.metoffice.gov.uk/climate/uk) by the size of the bunded handling area.

■ (Note: 1mm rainfall falling onto 1m² is equivalent to 1 litre entering the biobed). For example if your rainfall is 650mm and the handling area is 7m x 5m i.e. 35m² that's 27,750 litres.

■ Add the two figures together to reach the total amount of liquid to be processed. In this case let's assume the annual volume of pesticide waste and washings is 15,000 litres so the total will be 37,750 litres.

■ Given that a surface area of at least 1m² for every 1,000 litres of liquid is required, the biobed needs to be 38m² so in practical terms 6m wide by 6.5m long.

■ Note: The total volume of pesticide washings/runoff (excluding rainfall) being treated by a single biobed must not exceed 15,000 litres in any 12 month period so if you need to treat more, build another biobed.

How to build a simple offset biobed:

The type and size (see box) of biobed will depend on the particular circumstances of the farm. Typically many holdings already have a concrete area that is used for sprayer filling. In such cases, and provided there is room to build the biobed adjacent to the existing filling area, the offset version will be the most cost effective solution.

What you will need for the biobed:

- A suitable site 10m away from any surface water and 50m from any spring, well or borehole and adjacent to an impermeable filling area.
- Heavy duty synthetic liner with a 100mm bonded outlet and pump.
- Biomix – 1 part compost, 1 part topsoil, 2 parts straw
- Digging equipment to excavate the pit.
- 190gm/m² geotextile membrane and sand to line the pit.
- Drip irrigation system.

What you will need for the filling area:

- Concrete to build the bunded filling area or to bund existing area.
- ARCO drain or similar with silt trap.
- Two seamless polyethylene storage tanks – one for the inlet side and one for the outlet side.
- Two submersible pumps fitted with float switches – one for the inlet side and one for the outlet side. (Pumps with a nominal capacity of 50 litres/min at 6.5 head with 200 watt motor are generally suitable).
- Pipework to connect drain to storage tank.

What you have to do:

- Check that existing concreted area is in good condition (or construct new concrete

filling area). Build bund edge minimum 300mm wide by 100mm high around the entire perimeter of the handling area.

- Install ARCO type drain and silt trap to allow all the run-off from the handling area to be collected and directed to the temporary storage tank.
- Install the temporary storage tanks (one for the inlet side and one for the outlet side) and their pumps close to the biobed. Set pump switch levels to ensure no more than 1,500 litres of water is stored. Ensure the connections between the silt trap and the storage tank are secure.
- Connect up the drip irrigation pipework.
- Pre-mix the biomix and allow it to stand for 30 to 90 days.
- Dig the biobed pit so it is at least 1m and no more than 1.5m deep in the centre. You must have a minimum surface area of 1m² for every 1,000 litres of liquid requiring treatment. Soil side slopes of 30°-35° work well. Blind the sides with 25mm sand and overlay with the geotextile membrane followed by a 1.5mm thick liner of a type suitable for a small reservoir. The liner must be fitted in one seamless piece to prevent any leakage.
- Install the bonded outlet in the bottom of the liner to allow treated water to be pumped to the surface for re-use. Lay a coil of 100mm perforated drainage pipe in the base of the biobed, on top of the liner, and connect to the drain intake.
- The lined hole should be filled with the biomix and turfed over. Allow the turf to establish before using the biobed.
- Position the drip irrigation system bringing liquid from the outlet side temporary storage tank across the surface of the biobed.



The top of the concrete 'T' allows the boom to be opened so that tank washings can be sprayed out, collected and diverted to the biobed.



The 'biomix' is made from one part peat substitute, one part topsoil and two parts straw. This first needs composting for 30-90 days before use.



The concrete filling area takes shape, with the 300mm wide by 100mm high bunding on the edges to contain spills. The pad slopes towards the drain.



The biomix is then filled into the pit and left to settle and turfed over. The grass needs to establish before the biobed is used. The biomix lasts five years.



The pit for the biobed is lined with a geotextile membrane followed by a 1.5mm thick, one-piece liner of a type suitable for a small reservoir.



The drip irrigation system feeds the liquid into the top of the biobed. It trickles through the biomix and emerges as clean water.



The outlet in the base of the pit is fitted with a coil of 100mm diameter perforated drainage pipe. Pumps are fitted to the inlet and outlets.



Biobeds on three Lincolnshire farms were monitored to assess their suitability before gaining approval from the Environment Agency.

National Sprayer Testing Scheme

Because sprayer performance matters

Benefits of the NSTS:

- Satisfies crop assurance and food retailer protocols
- Reduces costly downtime
- Confirms accurate application
- Can be carried out on-farm
- Increases second-hand sprayer values
- Confirms commitment to the Voluntary Initiative



For further information contact your local test centre or visit the NSTS website www.nsts.org.uk. Telephone: 08456 448748

Guidance on using a lined biobed to dispose of agricultural waste consisting of non-hazardous pesticide solutions or washings (Exemption 52) is published by the Environment Agency.

The booklet gives detailed advice on siting, design and construction along with operation and management. It can be downloaded from the EA website at www.environment-agency.gov.uk but the easiest way to find it is via the NetRegs site at www.netregs.gov.uk and type biobeds in the site search facility.

Guidance is also available from the EA's agricultural waste line on **0845 603 3113**.

There is also a website at www.biobeds.info