A clear solution for farmers

CATCHMENT SENSITIVE FARMING

A "How to" Guide to Building a Biofilter to treat pesticide washings on the farm

Please note:
This guide is not intended as a replacement of the Biobed Manual, which gives full guidance on constructing a biobed/biofilter and can be found on Biobed web pages.

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1 Background

The biofilter is an innovative design that works on exactly the same principle as the biobed, but on a much smaller scale, for treating pesticide washings on farm.

Before you start, please consult your local Environment Agency office. This installation can cope with up to 15000 litres of pesticide washings per annum and is covered by the Environment Agency T32 waste exemption, which must be applied for prior to installation and commissioning of your system.

This system will work well for smaller scale farms or where the handling/loading area for the sprayer can be covered or sited inside an existing building, so that the volume of sprayer washings is reduced by removing rainfall.

This is a step-by-step, illustrated guide of the 'nuts and bolts' of how to build a biofilters, but does not replace the Biobed Manual which contains full guidance on constructing a biobed/ biofilter which can be found on the Biobeds web pages .

Please note:

If you are building this biofilter using a grant from the Catchment Sensitive Farming Capital Grant Scheme, then you must follow the specifications given in the Farmers Handbook – see www.naturalengland.org.uk/csf

For further information on pesticide handling and use please see www.voluntary initiative.org.uk

In Catchment Sensitive Farming (CSF) target areas, CSF will be happy to provide advice on design, location, building and grants available for building a biobed and pesticide management. Please see page 13 for contact details and additional information.

2 Choosing the site

The biofilter should not pose any risk to surface water or groundwater.

The lined biobed or filter must be constructed and maintained in line with the Biobed Manual and sited at least:

- 10 metres from a watercourse;
- 50 metres from a spring, well or borehole not used to supply water for domestic or food production;
- 250 metres from a borehole used to supply water for domestic or food production ‘

The Environment Agency should be consulted about risk to groundwater if the biofilter is to be sited in groundwater Source Protection Zone 1.

A concrete bund should be constructed round the biofilter to capture any spillage in the event of failure. It will also help to ensure that other farm machinery doesn’t accidently drive into the biofilter

Ideally the biofilter is best placed close to the filling area and chemical store. Where possible it should be sited away from the main thoroughfare of the yard, to minimise other farm traffic through the fill area and the risk of the biofilter being hit; and reduce the transfer of pesticides from vehicle traffic. The site needs to be located near to a power supply for the pump, but you could use a 12 volt system using a battery and solar charger if this is not possible.

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Parking the sprayer in the main thoroughfare of the yard means everything drives through the drips and spills

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Create a dedicated area in the corner of the yard out of the main drive-through. If you can, roof the area or build your sprayer loading area in an existing building

3 Parts and components required

Here's what you need:

Parts/Build list
NOTE – If you are building the unit with a CSF grant you must use new IBC's <u>not</u> second hand.

- 4 x 1000 litre Intermediate bulk container (IBC) (three IBC's for the biofilter and one as the holding tank)
- N.B. Alternatively, if your sprayer filling area drains to a large central sump you can use this as a holding/settlement tank.
- You could ask your agronomist if they can supply IBC's locally, widely available from agricultural and on line suppliers. If CSF Capital Grant funded, the IBC's must be new as second-hand containers cannot be funded.
- 9 x 15mm speedfit plastic elbows
- 15 x 15mm speedfit tees
- 1 x 15mm speedfit female – male coupling
- 4 x 3 metre lengths speedfit plastic pipe
- 4 x hose tail connector IBC outlet 60mm (Often supplied by IBC suppliers as an accessory – or available online)
- Cable ties of 150mm (6") in length
- Jubilee clips
- Submersible pump c/w float switch (possibly two depending on system design)
- Plastic delivery pipe 16 mm internal diameter
- Perforated irrigation hose
- Good quality topsoil, wheat or barley straw, peat free compost – sufficient to make at least 3m³ of "biomix" (you need some spare to top up post settling). N.B. This needs to be done three months before the biofilter is to be filled to allow for composting
- Silicone grease

15mm tee

90° Elbow

90° male – female

60mm IBC hose connector

Useful tools:
- **Plastic pipe cutter**
- **Cordless drill c/w 2mm drill bit**
- **9"/23cm angle grinder**
- **Pressure washer/ steam cleaner**

Pipe Cutter for quick and clean cuts without burrs and swarf

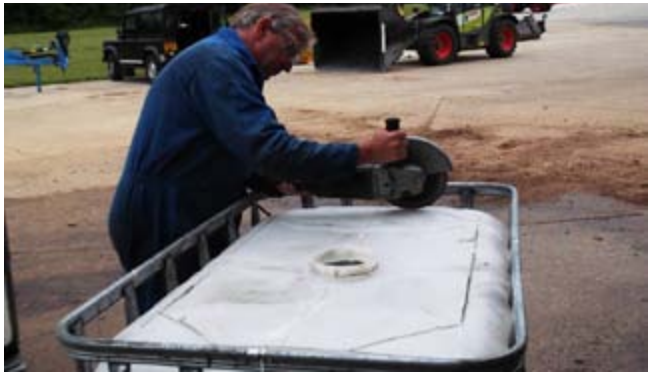
Biomix components Please see picture on page 6):
- **soil**
- **compost (peat free)**
- **straw**

N.B. The biomix needs to be prepared 1-3 months before you plan to fill your biofilter and left to stand to allow composting

4 Preparing the biofilter

Method
Ensure IBC's are thoroughly cleaned and rinsed. You should try to use containers with a 1000 litre capacity but smaller ones are acceptable (ones pictured are 750 litres) which are mounted on a plastic or metal pallet. If it has a top or upper steel brace support remove it for the next step.

Remove the tops of THREE IBC's



Try to leave in the corners to retain some of the strength and keep one of the cut lids. I marked out each IBC with a black marker and used a 9" angle grinder with metal cutting blade which left a good clean cut and only took a few minutes. Make sure you wear a dust mask and goggles.

Refit the steel brace/support. If your IBC does not have one you will need to provide some support to fix the irrigation pipe work to.

Cut the 15mm x 4 metre lengths pipe work as follows:

- 12 x 50 cm lengths
- 18 x 22 cm lengths
- 3 x 30 cm lengths

I strongly recommend using the proper cutting tool as it leaves the pipe un-distorted with no burrs and does make the push fit assembly quicker and leaves no swarf.

Assemble 3 x sets of pipe work using the elbows and tees (see picture below). Use silicone grease to ensure that the fittings are thoroughly pushed home and sealed.

Prior to fitting the pipe work to the underside of the frame, drill 2mm holes at 100mm intervals in the straight sections of the pipe, making sure that it is within the cut area of the IBC.

(TIP: it is much easier to drill the holes on a firm level surface before you use cable to tie the assembly to the frame.)

Ensure an even distribution of holes 100mm apart, make sure it's within the cut area. Once drilled, test it with some water and use cable ties to secure the pipe work to the underside of the frame.

Three IBC's complete with drilled and secured spray bars

Connect sufficient reinforced hose to join the plastic pipe to the IBC hose tail on two IBC's, secure with a jubilee clip at either end.

Stack the IBC's in a tower of three. You need enough hose to link two of the IBC's together once they have been stacked, i.e. the IBC at the top of the stack feeds from its outlet to the spray bar of the middle IBC then this feeds in to the top of the IBC at the base of the stack.

5 Mixing the biomix

Mix components thoroughly to allow composting to begin
www.youtube.com/watch?v=en0_GF4CFIU

Mix the three biomix components soil, compost (peat free) and straw thoroughly, allowing them to begin breaking down and settling. **The biomix needs to be prepared 1-3 months before you plan to fill your biofilter and left to stand to allow composting.**

6 Putting the unit together

Fill each IBC with a 5 cm (2") layer of pea shingle and preferably a layer of permeable membrane to stop silt blocking the pores in the shingle, then add the biomix (allow it to settle for a few days and top up - see detailed instruction in the Biobed Manual* – link below). Stack the three IBC's on top of one another, ensuring that they are secure. You could make a scaffold frame, tie them in to an existing building or use eye bolts in the concrete. We used a heavy duty ratchet strap and some steel road form pins hammered into the ground.

Photo: courtesy Ollie Stobo Oaklands Farm, Stonesfield

7 Where do I direct the outlet from the biofilter?

The sprayer filling area should drain to a sump which should be as large as is practicable as this will act as a sediment trap. The larger you can make it the easier it will be to clear out. House your submersible pump within the sediment trap. It must have a float switch and be easy to remove to enable sediment removal. Mount the pump on a breeze block or similar to raise it out of the heavily- sedimented zone.

If you don't have a large sump that can act as a sediment trap you can pump the liquid straight into a fourth IBC where the liquid can settle out. Please note that a second pump will be required for this set up.

Photo: courtesy Ollie Stobo Oaklands Farm, Stonesfield

The outlet pipe from the submersible directs the flow of washings straight to the top IBC.

Ensure that your pump specification meets the required head from sump to top of the third IBC. You could wrap your finished unit in black plastic as this help to absorb warmth and encourages evaporation.

Photo: courtesy Ollie Stobo Oaklands Farm, Stonesfield

Final irrigation from the lowest IBC is ideally by gravity-feed to an area of rough grassland or turf. Use perforated irrigation pipe to give an even application across the whole area. Healthy grass is a good indication that the system is functioning correctly.

Alternatively you could collect the liquid and re-use in the sprayer. To reduce the amount of winter rainfall entering the biofilter, place one of the cut lids on the top IBC to limit the rainwater entering but take care that the unit does not dry out. If you place the biofilter under cover you may have to top the unit up with water to keep the biomix moist.

8 Further information and links:

The Biobed Manual: Full guidance on constructing a biobed/biofilter on Biobed web pages

Environment Agency interactive maps to find out key environmental factors to be considered on your farm when considering installing a biobed/biofilter and loading/washdown area
www.environment-agency.gov.uk/homeandleisure/37793.aspx

Environment Agency's guidance on treatment of waste in a biobed or biofilter
www.environment-agency.gov.uk/business/topics/permitting/116363.aspx

Registering your T32 exemption
www.environment-agency.gov.uk/business/topics/permitting/116406.aspx

Further information on biobeds from the Voluntary Initiative
www.biobeds.info/content/default.asp

Further information on pesticide handling areas, pesticide application and planning and biobeds:
www.voluntaryinitiative.org.uk

Information on Catchment Sensitive Farming including where and what funding is available for biobeds/biofilters and loading /wash down areas
www.naturalengland.org.uk/csf

For any general queries about this guide please contact;

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